IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

MICROSOFT CORPORATION,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. 07-090-SLR
	)	
ALCATEL BUSINESS SYSTEMS and GENESYS TELECOMMUNICATIONS LABORATORIES, INC.	)	
	)	
Defendants.	)	

ANSWER AND COUNTERCLAIMS OF
GENESYS TELECOMMUNICATIONS LABORATORIES, INC.

Defendant Genesys Telecommunications Laboratories, Inc. ("Genesys") submits the following Answer and Counterclaims in response to the First Amended Complaint and Demand For Jury Trial of Plaintiff Microsoft Corporation ("Microsoft"):

THE PARTIES

1. Genesys is without knowledge or information sufficient to form a belief as to the truth of the allegations in Paragraph 1.

2. Genesys is without knowledge or information sufficient to form a belief as to the truth of the allegations in Paragraph 2.

3. Admits.

JURISDICTION AND VENUE

4. Genesys admits that the Complaint purports to allege an action for patent infringement under Title 35 of the United States Code, and that this Court has subject matter jurisdiction. Otherwise, this allegation contains conclusions of law to which no answer is required.

5. Genesys does not contest personal jurisdiction for purposes of this action, but denies that any infringing acts have occurred in this judicial district or elsewhere.

6. Genesys does not contest venue for purposes of this action, but denies that any infringing acts have occurred in this judicial district or elsewhere.

FACTS

7. Genesys admits that a copy of U.S. Patent No. 6,421,439 ("the '439 Patent"), entitled "System and Method for User Affiliation in a Telephone Network," is attached to the Complaint as Exhibit A. Genesys admits that the '439 Patent was issued by the United States Patent and Trademark Office on July 16, 2002 from U.S. Patent Application Serial No. 09/275,689, filed March 24, 1999, and names Stephen M. Liffick as the inventor, but denies that the '439 Patent was duly and legally issued. Genesys is without knowledge or information sufficient to form a belief as to the truth of the allegations that "Microsoft is the owner by valid assignment of the entire right, title, and interest in and to United States Patent No. 6,421,439" and on that basis denies such allegations and all remaining allegations in Paragraph 7.

8. Genesys admits that a copy of U.S. Patent No. 6,430,289 ("the '289 Patent"), entitled "System and Method for Computerized Status Monitor and use in a Telephone Network," is attached to the Complaint as Exhibit B. Genesys admits that the '289 Patent was issued by the United States Patent and Trademark Office on August 6, 2002 from U.S. Patent Application Serial No. 09/291,693 filed April 13, 1999, and names Stephen M. Liffick as the inventor, but denies that the '289 Patent was duly and legally issued. Genesys is without knowledge or information sufficient to form a belief as to the truth of the allegations that "Microsoft is the owner by valid assignment of the entire right, title, and interest in and to United

States Patent No. 6,430,289" and on that basis denies such allegations and all remaining allegations in Paragraph 8.

9. Genesys admits that a copy of United States Patent No. 6,263,064 ("the '064 Patent") entitled "Centralized Communication Control Center for Visually and Audibly Updating Communication Options Associated With Communication Services of a Unified Messaging System and Methods Therefor," is attached to the Complaint as Exhibit C. Genesys admits that the '064 Patent was issued by the United States Patent and Trademark Office on July 17, 2001 from U.S. Patent Application Serial No. 09/239,585, filed January 29, 1999, and names Stephen C. O'Neal and John Jiang as the inventors, but denies that the '064 Patent was duly and legally issued. Genesys is without knowledge or information sufficient to form a belief as to the truth of the allegations that "Microsoft is the owner by valid assignment of the entire right, title, and interest in and to United States Patent 6,263,064 B1" and on that basis denies such allegations and all remaining allegations in Paragraph 9.

10. Genesys admits that a copy of United States Patent No. 6,728,357 ("the '357 Patent") entitled "Centralized Communication Control Center and Methods Therefor" is attached to the Complaint as Exhibit D. Genesys admits that the '357 Patent was issued by the United States Patent and Trademark Office on April 27, 2004, and names Stephen C. O'Neal and John Jiang as the inventors, but denies that the '357 Patent was duly and legally issued. Genesys is without knowledge or information sufficient to form a belief as to the truth of the allegations that "Microsoft is the owner by valid assignment of the entire right, title, and interest in and to United States Patent 6,728,357" and on that basis denies such allegations and all remaining allegations in Paragraph 10.

COUNT I: ABS'S INFRINGEMENT OF UNITED STATES PATENT NO. 6,421,439

11. Genesys incorporates by reference each of its answers to Paragraphs 1-10 above.

12. Paragraph 12 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 12 contains any factual allegations requiring a response from Genesys, such allegations are denied.

13. Paragraph 13 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 13 contains any factual allegations requiring a response from Genesys, such allegations are denied.

14. Paragraph 14 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 14 contains any factual allegations requiring a response from Genesys, such allegations are denied.

15. Paragraph 15 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 15 contains any factual allegations requiring a response from Genesys, such allegations are denied..

16. Paragraph 16 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 16 contains any factual allegations requiring a response from Genesys, such allegations are denied..

COUNT II: ABS'S INFRINGEMENT OF UNITED STATES PATENT NO. 6,430,289

17. Genesys incorporates by reference each of its answers to Paragraphs 1-16 above.

18. Paragraph 18 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 18 contains any factual allegations requiring a response from Genesys, such allegations are denied.

19. Paragraph 19 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 19 contains any factual allegations requiring a response from Genesys, such allegations are denied.

20. Paragraph 20 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 20 contains any factual allegations requiring a response from Genesys, such allegations are denied.

21. Paragraph 21 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 21 contains any factual allegations requiring a response from Genesys, such allegations are denied.

22. Paragraph 22 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 22 contains any factual allegations requiring a response from Genesys, such allegations are denied.

COUNT III: ABS'S INFRINGEMENT OF UNITED STATES PATENT NO. 6,263,064

23. Genesys incorporates by reference each of its answers to Paragraphs 1-22 above.

24. Paragraph 24 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 24 contains any factual allegations requiring a response from Genesys, such allegations are denied.

25. Paragraph 25 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 25 contains any factual allegations requiring a response from Genesys, such allegations are denied.

26. Paragraph 26 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 26 contains any factual allegations requiring a response from Genesys, such allegations are denied.

27. Paragraph 27 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 27 contains any factual allegations requiring a response from Genesys, such allegations are denied.

28. Paragraph 28 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 28 contains any factual allegations requiring a response from Genesys, such allegations are denied.

COUNT IV: ABS'S INFRINGEMENT OF UNITED STATES PATENT NO. 6,728,357

29. Genesys incorporates by reference each of its answers to Paragraphs 1-28 above.

30. Paragraph 30 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 30 contains any factual allegations requiring a response from Genesys, such allegations are denied.

31. Paragraph 31 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 31 contains any factual allegations requiring a response from Genesys, such allegations are denied.

32. Paragraph 32 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 32 contains any factual allegations requiring a response from Genesys, such allegations are denied.

33. Paragraph 33 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 33 contains any factual allegations requiring a response from Genesys, such allegations are denied.

34. Paragraph 34 contains allegations not directed to Genesys and therefore requires no response from Genesys. To the extent Paragraph 34 contains any factual allegations requiring a response from Genesys, such allegations are denied.

COUNT V: GENESYS'S INFRINGEMENT OF U.S. PATENT NO. 6,421,439

35. Genesys incorporates by reference each answer to Paragraphs 1-34 above.

36. Genesys denies each and every allegation contained in Paragraph 36, and specifically denies any wrongdoing or infringement.

37. Genesys denies each and every allegation contained in Paragraph 37, and specifically denies any wrongdoing or infringement.

38. Genesys denies each and every allegation contained in Paragraph 38, specifically denies any wrongdoing or infringement, and further denies any willful infringement.

39. Genesys denies each and every allegation contained in Paragraph 39, specifically denies any wrongdoing or infringement, and further denies that Microsoft is entitled to recover any damages whatsoever.

40. Genesys denies each and every allegation contained in Paragraph 40, and specifically denies any wrongdoing or infringement.

COUNT VI: GENESYS'S INFRINGEMENT OF U.S. PATENT NO. 6,430,289

41. Genesys incorporates by reference each answer to Paragraphs 1-40 above.

42. Genesys denies each and every allegation contained in Paragraph 42, and specifically denies any wrongdoing or infringement.

43. Genesys denies each and every allegation contained in Paragraph 43, and specifically denies any wrongdoing or infringement.

44. Genesys denies each and every allegation contained in Paragraph 44, specifically denies any wrongdoing or infringement, and further denies any willful infringement.

45. Genesys denies each and every allegation contained in Paragraph 45, specifically denies any wrongdoing or infringement, and further denies that Microsoft is entitled to recover any damages whatsoever.

46. Genesys denies each and every allegation contained in Paragraph 46, and specifically denies any wrongdoing or infringement.

AFFIRMATIVE DEFENSES

As and for its Affirmative Defenses, Genesys alleges as follows:

First Affirmative Defense
(Failure to State a Claim)

47. Microsoft's purported claims fail to state a claim upon which relief can be granted.

Second Affirmative Defense
(Non-Infringement)

48. Genesys has not directly infringed, contributed to the infringement, or induced the infringement of any claim of the '439 Patent or the '289 Patent.

Third Affirmative Defense
(Patent Invalidity)

49. The claims of the '439 Patent and the '289 Patent are invalid for failure to comply with the requirements of 35 U.S.C. §§ 1 *et seq*.

Fourth Affirmative Defense
(Inequitable Conduct)

50. The '439 Patent and the '289 Patent are unenforceable due to inequitable conduct.

51. The '439 Patent and the '289 Patent both issued to Stephen M. Liffick. The '439 Patent and the '289 Patent claim virtually identical inventions. Claim 1 of the '439 Patent claims:

> In an environment where subscribers call a user over a telephone network, wherein a user telephone is coupled with the telephone network, a system for processing an incoming call from a subscriber to a user in the telephone network according to user specifications, the system comprising:
>
> a data structure contained within a computer network to store user-selectable criteria for call processing, wherein the data structure stores the user-selectable criteria in one or more lists that are used in filtering an incoming call and wherein some of the one or more lists are used to filter the incoming call according to current activity of subscribers on the computer network or according to current activity of the user on the computer network;
>
> a computer network access port used by the telephone network to access the data structure such that the telephone network has access to the one or more lists over the computer network access port; and
>
> a controller to receive the incoming call designated for the user telephone and to process the incoming call in accordance with the user-selectable criteria, the controller accessing the user-selectable criteria in the one or more lists of the data structure via the computer network access port and thereby applying the user-selectable criteria to the incoming call.

Similarly, claim 1 of the '289 Patent claims:

> In a system that includes a telephone network and a computer network with one or more users, wherein each user is connected through a user computer the computer network and is logically connected through the computer network to the telephone network, a method of determining when to establish telephone communication between two parties, at least one of whom is a user connected to said computer network, comprising:
>
> at the computer network, receiving information from the telephone network that a first party from whom a call is originating desires to establish telephone communication with a second party;
>
> at the computer network, monitoring activity of a user computer connected to the computer network and associated with the second party;
>
> at the computer network, storing a set of pre-determined rules for determining when the second party is available to take a call from the first party;
>
> at the computer network, using the set of a pre-determined rules to process i) the information received from the telephone network regarding the call being originated by the first party, and ii) information regarding the monitored activity of the user computer of the second party, to determine when the second party is available to take the call originated by the first party; and
>
> using the information processed at the computer network to facilitate connecting the call originated by the first party through the telephone network to the second party.

52. During the prosecution of the application leading to the '439 Patent only three prior art references were considered by the examiner of that application. During the prosecution of the application leading to the '289 Patent, only five prior art references were considered by the examiner of that application. The '439 Patent and the '289 Patent were examined by different patent examiners. None of the prior art references before the examiner of the '289 Patent were before the examiner of the '439 Patent.

53. On information and belief, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application for the '439 Patent were aware of the disclosures contained in the prior art references considered by the examiner of the '289 Patent. The references cited during the prosecution of the '289 Patent were highly material to the claims of the '439 Patent. On information and belief, during prosecution of the '439 Patent, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application for the '439 Patent knew that one or more of the references cited during the prosecution of the '289 Patent were material to the patentability of the claims of the '439 Patent. On information and belief, during the prosecution of the application for the '439 Patent, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application withheld and failed to disclose the references cited in the application for the '289 Patent with an intent to deceive the United States Patent and Trademark Office.

54. On information and belief, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application for the '289 Patent were aware of the disclosures contained in the prior art references considered by the examiner of the '439 Patent. The references cited during the prosecution of the '439 patent were highly material to the claims of the '289 Patent. On information and belief, during prosecution of the '289 Patent, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application for the '289 Patent knew that one or more of the references cited during the prosecution of the '439 Patent were material to the patentability of the claims of the '439 Patent. On information and belief, during the prosecution of the application leading to the '289 Patent, one or more of the inventor, and/or

the prosecuting attorneys, and/or others associated with the filing and prosecution of the application withheld and failed to disclose the references cited in the application for the '439 Patent with an intent to deceive the United States Patent and Trademark Office.

Fifth Affirmative Defense
(Laches)

55. Microsoft's claim for any damages purportedly incurred prior to filing this action is barred by the equitable doctrine of laches.

Sixth Affirmative Defense
(Failure to Mark)

56. On information and belief, Microsoft has not marked its products in accordance with 35 U.S.C. § 287 and, accordingly, Microsoft's damages claim is limited in accordance with that statute.

COUNTERCLAIMS

As and for its counterclaims against Plaintiff Microsoft Corporation, Genesys Telecommunications Laboratories, Inc. alleges as follows:

Parties

1. Counterclaim-Plaintiff Genesys Telecommunications Laboratories, Inc. ("Genesys") is incorporated in California and has its offices at 2001 Junipero Serra Boulevard, Daly City, California 94014.

2. Counterclaim-Defendant Microsoft Corporation ("Microsoft") is a Washington corporation with a principal place of business at One Microsoft Way, Redmond, Washington 98052.

Jurisdiction and Venue

3. This is an action for patent infringement arising under the patent laws of the United States, Title 35 of the United States Code. This Court has subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338.

4. This is also an action for declaratory relief for which this Court has jurisdiction under 28 U.S.C. §§ 1331, 1338 and 2201.

5. Venue is proper in this Court under 28 U.S.C. §§ 1391 and 1400 because Microsoft has committed acts of infringement in and is subject to personal jurisdiction in this judicial district, and because Microsoft has consented to the propriety of venue in this Court by filing its claim for patent infringement in this Court.

Facts

6. Genesys is the owner by valid assignment of the entire right, title, and interest in and to United States Patent No. 6,167,395 ("the '395 Patent") entitled "Method and

Apparatus for Creating Specialized Multimedia Threads in a Multimedia Communication Center." The '395 Patent, which was duly and legally issued by the United States Patent and Trademark Office on December 26, 2000, is attached hereto as Exhibit A. The inventors of the '395 Patent are Christopher Clemmett MacLeod Beck, Jonathan Michael Berke, Joel A. Johnstone, Robin Marie Mitchell, James Karl Powers, Mark Franklin Sidell and Charles Dazler Knuff.

7. Genesys is the owner by valid assignment of the entire right, title, and interest in and to United States Patent No. 5,953,332 ("the '332 Patent") entitled "Agent-initiated Dynamic Requeing." The '332 Patent, which was duly and legally issued by the United States Patent and Trademark Office on September 14, 1999, is attached hereto as Exhibit B. The inventor of the '332 Patent is Alec Miloslavsky.

Count I: Non-Infringement

8. Genesys incorporates by reference paragraphs 1-7 as if fully set forth herein.

9. By the filing of its Complaint, Microsoft has purported to assert a claim against Genesys for the alleged infringement of the '439 Patent and the '289 Patent.

10. Genesys has denied Microsoft's allegations of infringement and believes that the Complaint has been filed without good cause.

11. An actual controversy exists between Microsoft and Genesys in that Microsoft contends that the '439 Patent and the '289 Patent are infringed by Genesys, and Genesys in turn contends that it does not infringe these patents.

12. Genesys is entitled to judgment from this Court that the '439 patent and the '289 Patent are not infringed by Genesys or any of its products.

Count II: Invalidity

13. Genesys incorporates by reference paragraphs 1-12 as if fully set forth herein.

14. An actual controversy exists between Microsoft and Genesys in that Microsoft contends that the '439 Patent and the '289 Patent are valid and enforceable, while Genesys in turn contends that these patents are invalid and/or unenforceable.

15. As a result, Genesys is entitled to judgment from this Court finding that the '439 Patent and the '289 Patent are invalid pursuant to 35 U.S.C. §§ 1 et seq.

Count III: Unenforceability

16. Genesys incorporates by reference paragraphs 1-15 as if fully set forth herein.

17. An actual controversy exists between Microsoft and Genesys in that Microsoft contends that the '439 Patent and the '289 Patent are valid and enforceable, while Genesys in turn contends that these patents are invalid and/or unenforceable.

18. The '439 Patent and the '289 Patent are unenforceable due to inequitable conduct.

19. The '439 Patent and the '289 Patent both issued to Stephen M. Liffick. The '439 Patent and the '289 Patent claim virtually identical inventions. Claim 1 of the '439 Patent claims:

> In an environment where subscribers call a user over a telephone network, wherein a user telephone is coupled with the telephone network, a system for processing an incoming call from a subscriber to a user in the telephone network according to user specifications, the system comprising:
>
> a data structure contained within a computer network to store user-selectable criteria for call processing, wherein the data structure stores the user-selectable criteria in one or more lists that are used

> in filtering an incoming call and wherein some of the one or more lists are used to filter the incoming call according to current activity of subscribers on the computer network or according to current activity of the user on the computer network;
>
> a computer network access port used by the telephone network to access the data structure such that the telephone network has access to the one or more lists over the computer network access port; and
>
> a controller to receive the incoming call designated for the user telephone and to process the incoming call in accordance with the user-selectable criteria, the controller accessing the user-selectable criteria in the one or more lists of the data structure via the computer network access port and thereby applying the user-selectable criteria to the incoming call.

Similarly, claim 1 of the '289 Patent claims:

> In a system that includes a telephone network and a computer network with one or more users, wherein each user is connected through a user computer the computer network and is logically connected through the computer network to the telephone network, a method of determining when to establish telephone communication between two parties, at least one of whom is a user connected to said computer network, comprising:
>
> at the computer network, receiving information from the telephone network that a first party from whom a call is originating desires to establish telephone communication with a second party;
>
> at the computer network, monitoring activity of a user computer connected to the computer network and associated with the second party;
>
> at the computer network, storing a set of pre-determined rules for determining when the second party is available to take a call from the first party;
>
> at the computer network, using the set of a pre-determined rules to process i) the information received from the telephone network regarding the call being originated by the first party, and ii) information regarding the monitored activity of the user computer of the second party, to determine when the second party is available to take the call originated by the first party; and

using the information processed at the computer network to facilitate connecting the call originated by the first party through the telephone network to the second party.

20. During the prosecution of the application leading to the '439 Patent only three prior art references were considered by the examiner of that application. During the prosecution of the application leading to the '289 Patent, only five prior art references were considered by the examiner of that application. The '439 Patent and the '289 Patent were examined by different patent examiners. None of the prior art references before the examiner of the '289 Patent were before the examiner of the '439 Patent.

21. On information and belief, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application for the '439 Patent were aware of the disclosures contained in the prior art references considered by the examiner of the '289 Patent. The references cited during the prosecution of the '289 Patent were highly material to the claims of the '439 Patent. On information and belief, during prosecution of the '439 Patent, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application for the '439 Patent knew that one or more of the references cited during the prosecution of the '289 Patent were material to the patentability of the claims of the '439 Patent. On information and belief, during the prosecution of the application for the '439 Patent, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application withheld and failed to disclose the references cited in the application for the '289 Patent with an intent to deceive the United States Patent and Trademark Office.

22. On information and belief, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application for the '289 Patent were aware of the disclosures contained in the prior art references considered

by the examiner of the '439 Patent. The references cited during the prosecution of the '439 patent were highly material to the claims of the '289 Patent. On information and belief, during prosecution of the '289 Patent, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application for the '289 Patent knew that one or more of the references cited during the prosecution of the '439 Patent were material to the patentability of the claims of the '439 Patent. On information and belief, during the prosecution of the application leading to the '289 Patent, one or more of the inventor, and/or the prosecuting attorneys, and/or others associated with the filing and prosecution of the application withheld and failed to disclose the references cited in the application for the '439 Patent with an intent to deceive the United States Patent and Trademark Office.

23. As a result, Genesys is entitled to judgment from this Court finding that the '439 Patent and the '289 Patent are unenforceable.

Count IV: Infringement of U.S. Patent No. 6,167,395

24. Genesys incorporates by reference paragraphs 1-23 as if fully set forth herein.

25. Microsoft has been and is now making, using, selling, offering for sale products within the United States, or importing into the United States, products that infringe the '395 Patent.

26. Microsoft has been and is now contributing to the infringement of and/or actively inducing the infringement of the '395 Patent by others.

27. Microsoft's infringement of the '395 Patent has injured Genesys, and thus Genesys is entitled to recover damages adequate to compensate for that infringement.

28. Microsoft's acts of infringement have caused and will continue to cause irreparable injury to Genesys unless and until enjoined by this Court.

Count V: Infringement of U.S. Patent No. 5,953,332

29. Genesys incorporates by reference paragraphs 1-28 as if fully set forth herein.

30. Microsoft has been and is now making, using, selling, offering for sale within the United States, or importing into the United States, products that infringe the '332 Patent.

31. Microsoft has been and is now contributing to the infringement of and/or actively inducing the infringement of the '332 Patent by others.

32. Microsoft's infringement of the '332 patent has injured Genesys, and thus Genesys is entitled to recover damages adequate to compensate for that infringement.

33. Microsoft's acts of infringement have caused and will continue to cause irreparable injury to Genesys unless and until enjoined by this Court.

RELIEF

WHEREFORE, Genesys seeks judgment as follows:

A. That U.S. Patent Nos. 6,421,439 and 6,430,289 are not infringed and invalid;

B. That U.S. Patent Nos. 6,421,439 and 6,430,289, and every claim thereof, are unenforceable;

C. That Microsoft take nothing by its Complaint and that Microsoft's Complaint be dismissed with prejudice;

D. That Microsoft infringes U.S. Patent Nos. 6,167,395 and 5,953,332;

E. That Microsoft and its officers, agents, employees, representatives, successors, and assigns, and any others acting in concert with them be preliminarily and permanently enjoined from infringing U.S. Patent Nos. 6,167,395 and 5,953,332;

F. That Genesys be awarded damages resulting from Microsoft's infringement adequate to compensate it for that infringement;

G. That, pursuant to 35 U.S.C. § 285, the Court find that this an exceptional case;

H. That Genesys be awarded its attorneys' fees incurred in connection with this action; and

I. That Genesys be granted such other and additional relief as this Court deems just and proper.

DEMAND FOR JURY TRIAL

Genesys hereby demands a trial by jury.

MORRIS, NICHOLS, ARSHT & TUNNELL LLP

/s/ Maryellen Noreika

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Date: July 13, 2007

CERTIFICATE OF SERVICE

I, Maryellen Noreika, hereby certify that on July 13, 2007, I electronically filed the foregoing document, which will send notification of such filing(s) to the following:

Thomas L. Halkowski, Esquire
Fish & Richardson

I also certify that copies were caused to be served on July 13, 2007 upon the following in the manner indicated:

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US006167395A

United States Patent [19]

Beck et al.

[11] Patent Number: 6,167,395

[45] Date of Patent: Dec. 26, 2000

[54] METHOD AND APPARATUS FOR CREATING SPECIALIZED MULTIMEDIA THREADS IN A MULTIMEDIA COMMUNICATION CENTER

[75] Inventors: **Christopher Clemmett Macleod Beck**, Oceanside; **Jonathan Michael Berke**; **Joel A. Johnstone**, both of San Diego; **Robin Marie Mitchell**, Cardiff; **James Karl Powers**, Carlsbad, all of Calif.; **Mark Franklin Sidell**, Chapel Hill, N.C.; **Charles Dazler Knuff**, Carlsbad, Calif.

[73] Assignee: **Genesys Telecommunications Laboratories, Inc**, San Francisco, Calif.

[21] Appl. No.: **09/183,390**

[22] Filed: **Oct. 29, 1998**

Related U.S. Application Data

[63] Continuation-in-part of application No. 09/182,937, Oct. 29, 1998, Pat. No. 6,138,139, and a continuation-in-part of application No. 09/183,395, Oct. 29, 1998, and a continuation-in-part of application No. 09/183,551, Oct. 29, 1998, and a continuation-in-part of application No. 09/182,745, Oct. 28, 1998, and a continuation-in-part of application No. 09/151,429, Sep. 11, 1998, and a continuation-in-part of application No. 09/151,710, Sep. 11, 1998, and a continuation-in-part of application No. 09/151,564, Sep. 11, 1998, Pat. No. 6,108,711.

[51] **Int. Cl.**[7] **G06F 17/30**

[52] **U.S. Cl.** **707/3**

[58] **Field of Search** 707/6, 3, 1

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,857,184	1/1999	Lynch	707/4
5,893,912	4/1999	Freund et al.	707/103
6,021,428	2/2000	Miloslavsky	709/206

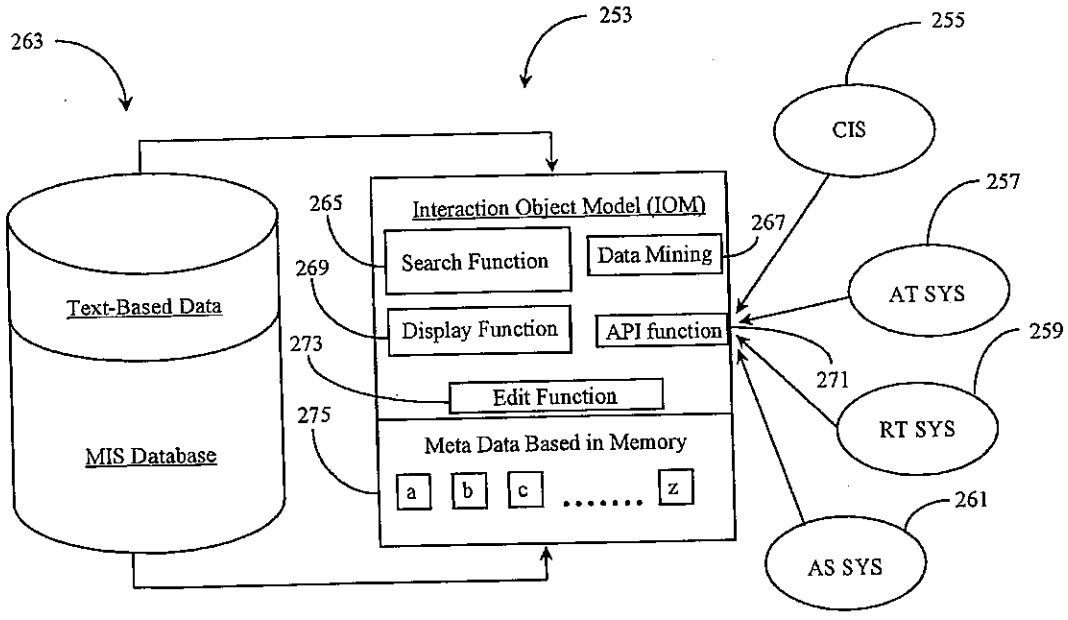
Primary Examiner—Kenneth R. Coulter

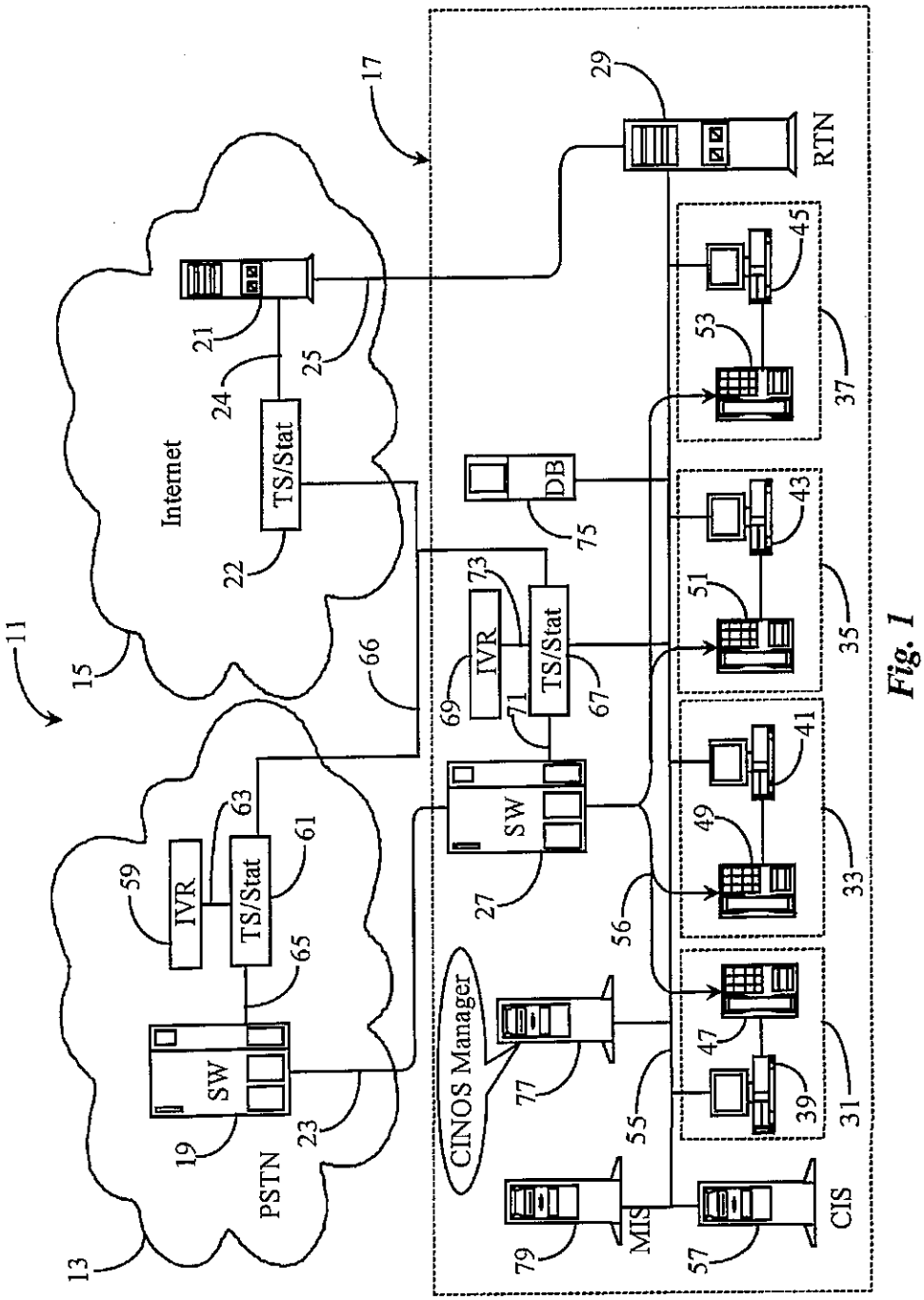
Attorney, Agent, or Firm—Donald R. Boys; Central Coast Patent Agency

[57] **ABSTRACT**

In a multimedia call center (MMCC) supporting multiple channels and forms of communication and storing call center transactions in a data repository, a threading software application has a programming input for a user to enter association criteria, an access function that accesses at least stored data in the data repository, a search function that searches accessed data for association criteria, and notes those data entities that meet the association criteria; and a display function that display at least indicators of data entities meeting the association criteria. The threading application serves as a research toll for mining data repositories of the call center for information pertinent to business goals of the enterprise hosting the call center. IN some embodiments the application is capable of associating transactions occurring real time as well as stored data.

14 Claims, 16 Drawing Sheets




11
13
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39
41
43
45
47
49
51
53
55
56
57
59
61
63
65
66
67
69
71
73
75
77
79
Internet
PSTN
TS/Stat
IVR
SW
DB
CINOS Manager
MIS
CIS
RTN

Fig. 1

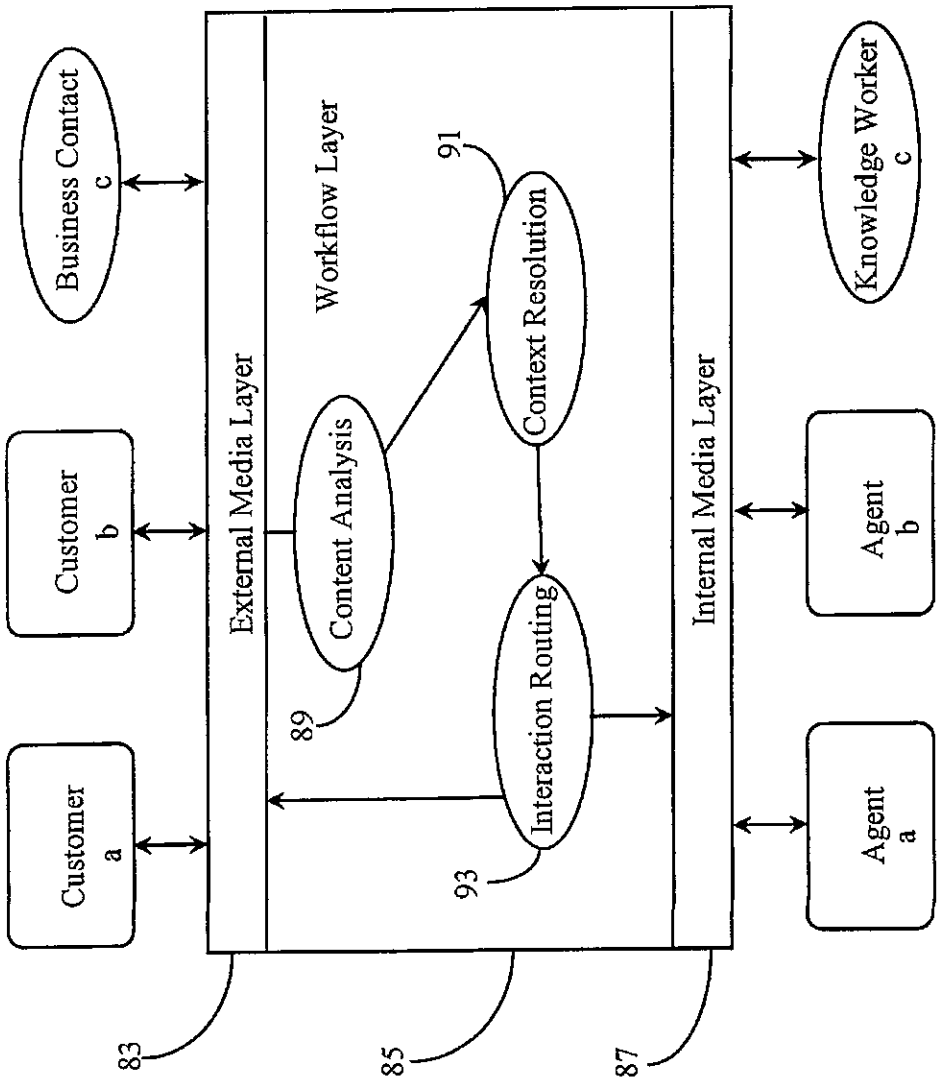

Business Contact c
Customer b
Customer a
External Media Layer
Workflow Layer
Content Analysis
Context Resolution
Interaction Routing
Internal Media Layer
Knowledge Worker c
Agent b
Agent a
89
91
93
83
85
87

Fig. 2

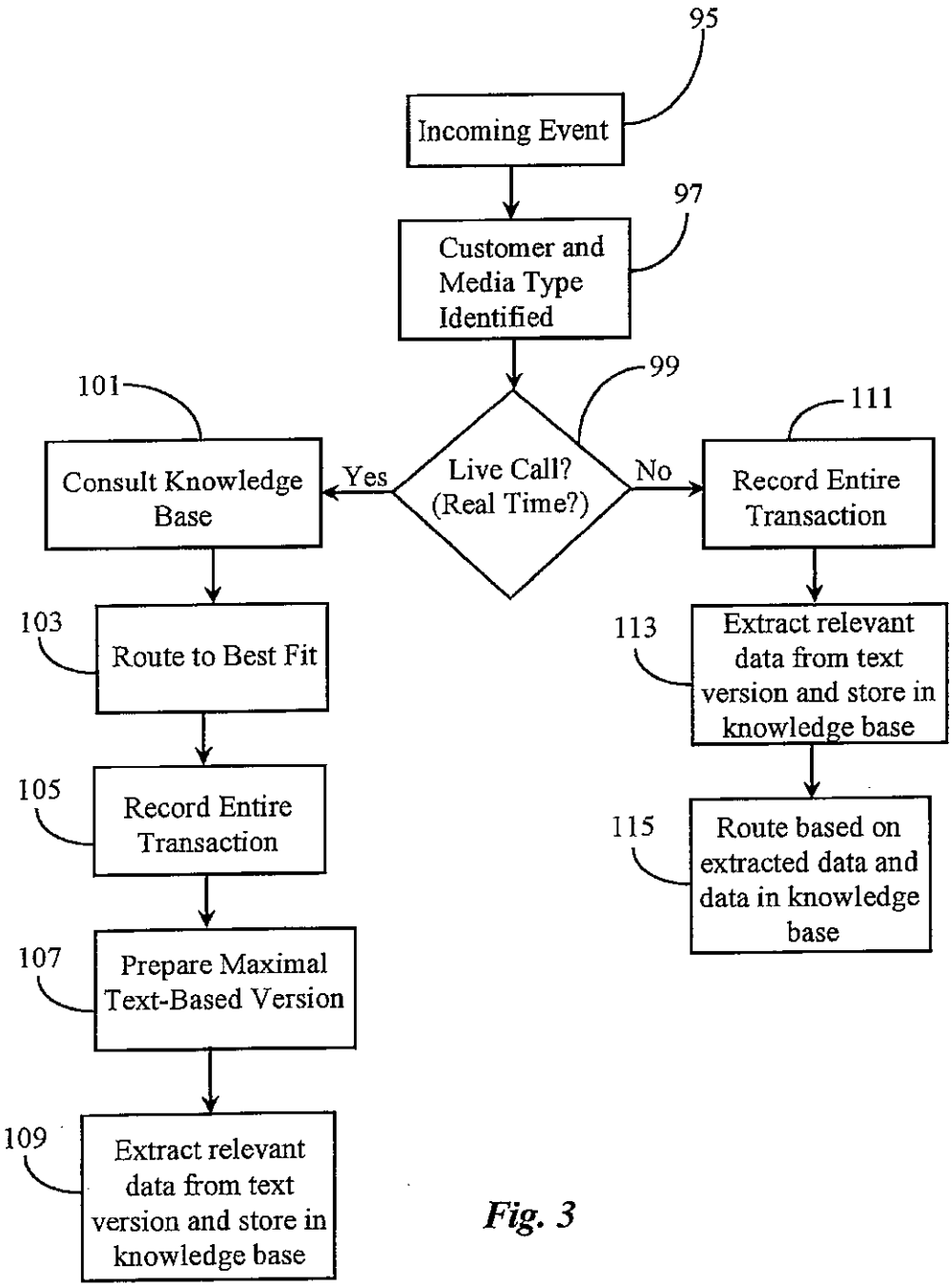

95
Incoming Event
97
Customer and Media Type Identified
99
Live Call? (Real Time?)
Yes
No
101
Consult Knowledge Base
111
Record Entire Transaction
103
Route to Best Fit
113
Extract relevant data from text version and store in knowledge base
105
Record Entire Transaction
115
Route based on extracted data and data in knowledge base
107
Prepare Maximal Text-Based Version
109
Extract relevant data from text version and store in knowledge base

Fig. 3

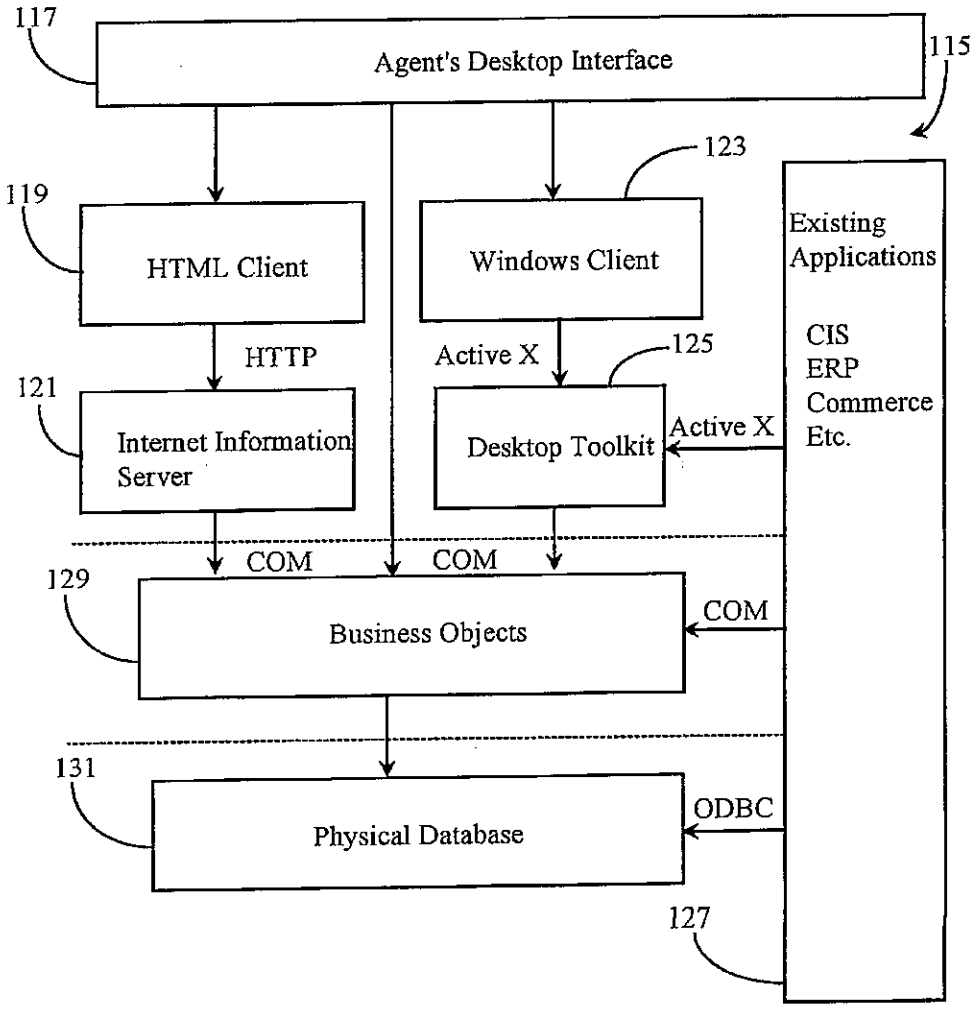

117
Agent's Desktop Interface
115
123
119
HTML Client
Windows Client
Existing Applications
CIS
ERP
Commerce
Etc.
HTTP
Active X
125
121
Internet Information Server
Desktop Toolkit
Active X
COM
COM
129
Business Objects
COM
131
Physical Database
ODBC
127

Fig. 4

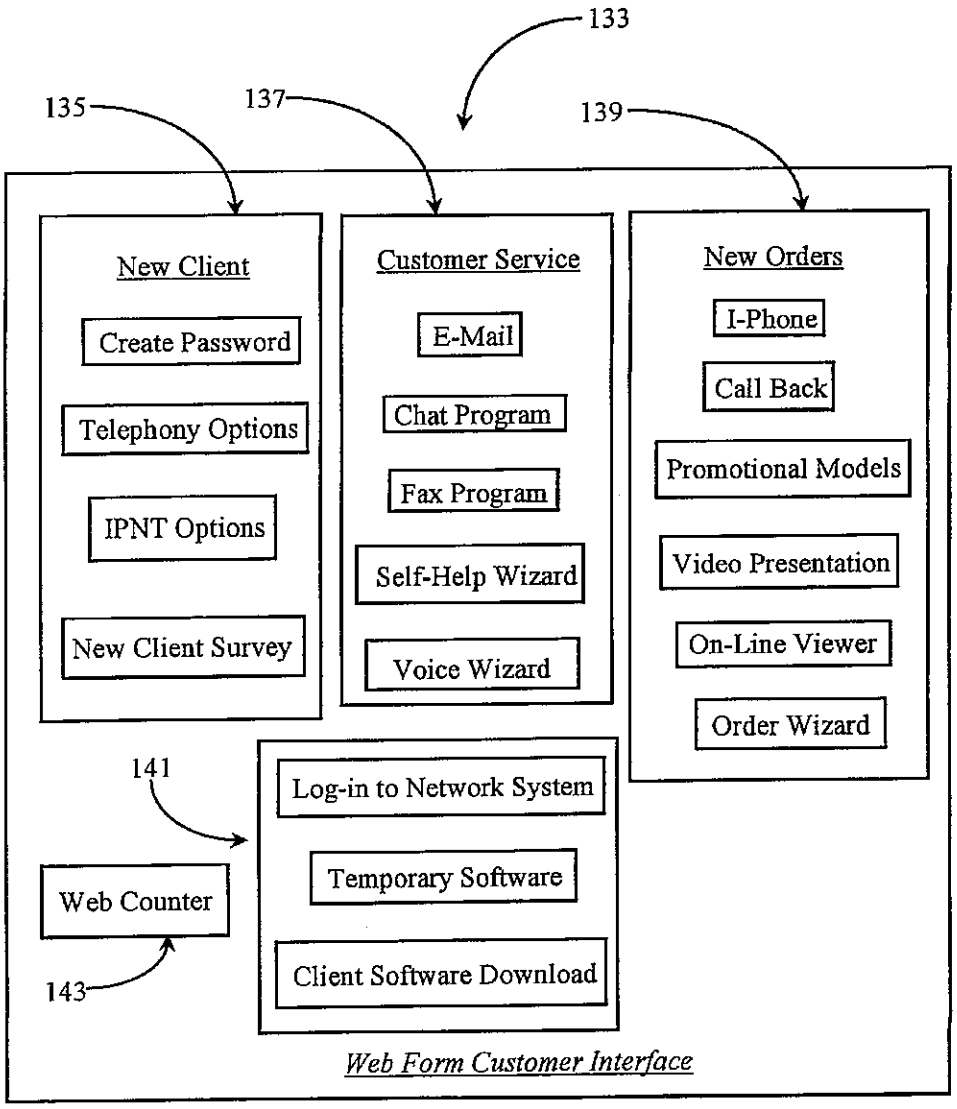

133
135
137
139
New Client
Create Password
Telephony Options
IPNT Options
New Client Survey
Customer Service
E-Mail
Chat Program
Fax Program
Self-Help Wizard
Voice Wizard
New Orders
I-Phone
Call Back
Promotional Models
Video Presentation
On-Line Viewer
Order Wizard
141
Log-in to Network System
Temporary Software
Client Software Download
Web Counter
143
Web Form Customer Interface

Fig. 5

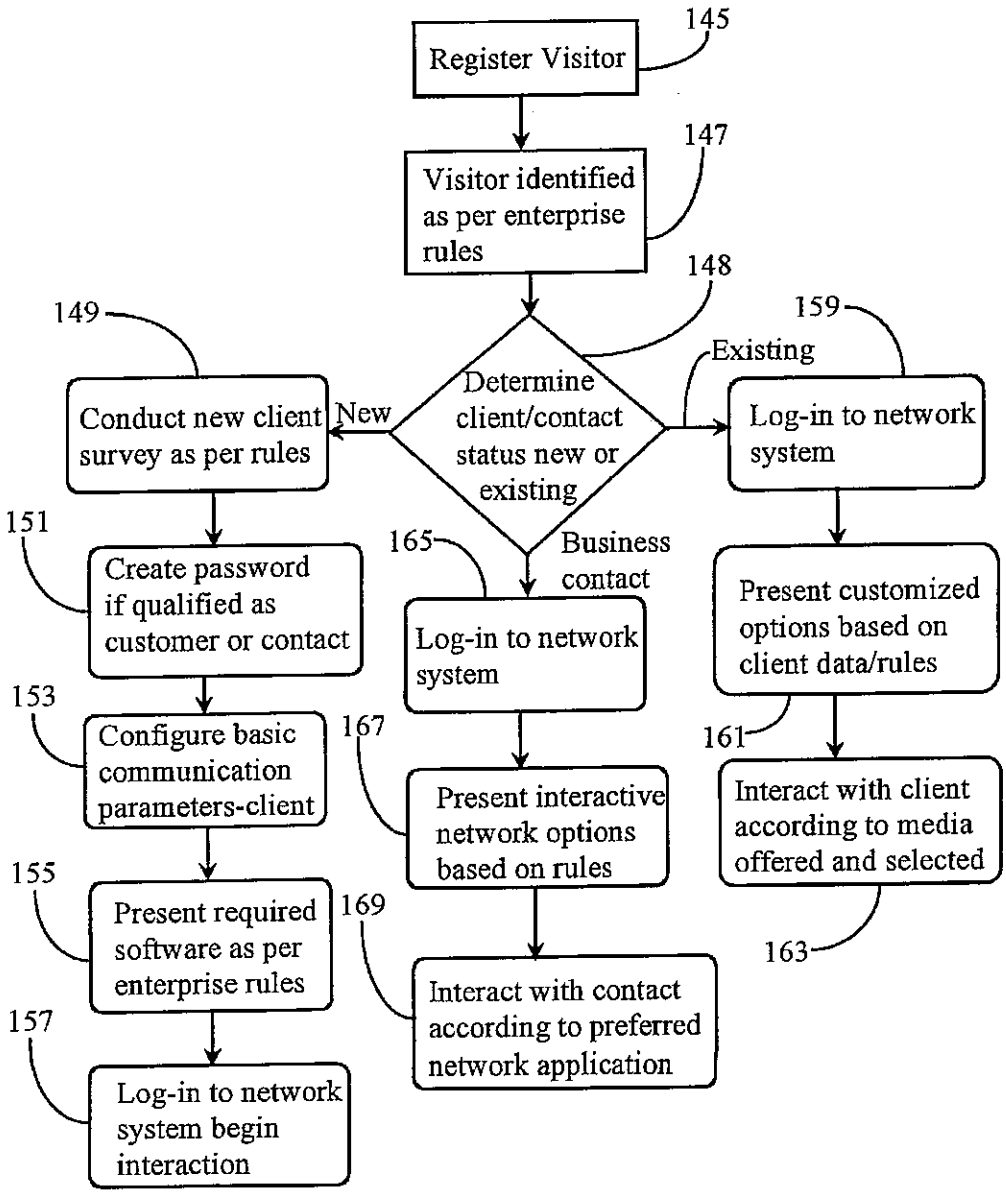

Register Visitor
145
Visitor identified as per enterprise rules
147
148
Determine client/contact status new or existing
New
Existing
Business contact
149
Conduct new client survey as per rules
159
Log-in to network system
151
Create password if qualified as customer or contact
165
Log-in to network system
Present customized options based on client data/rules
153
Configure basic communication parameters-client
167
Present interactive network options based on rules
161
Interact with client according to media offered and selected
155
Present required software as per enterprise rules
169
Interact with contact according to preferred network application
163
157
Log-in to network system begin interaction

Fig. 6

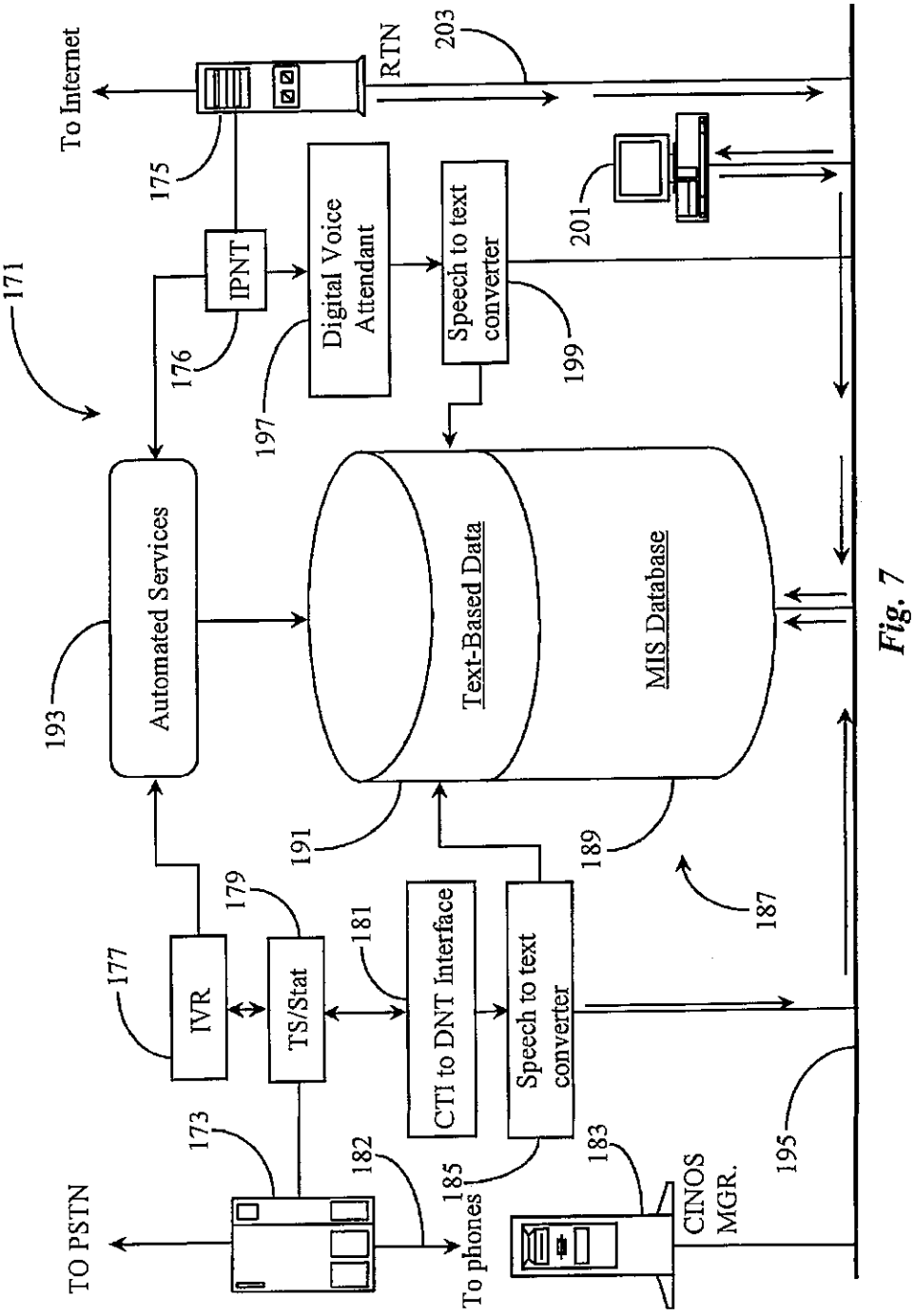

To Internet
175
RTN
203
171
IPNT
176
Digital Voice Attendant
197
Speech to text converter
199
201
Automated Services
193
Text-Based Data
MIS Database
191
189
187
179
177
IVR
TS/Stat
181
CTI to DNT Interface
Speech to text converter
173
182
185
183
195
TO PSTN
To phones
CINOS MGR.

Fig. 7

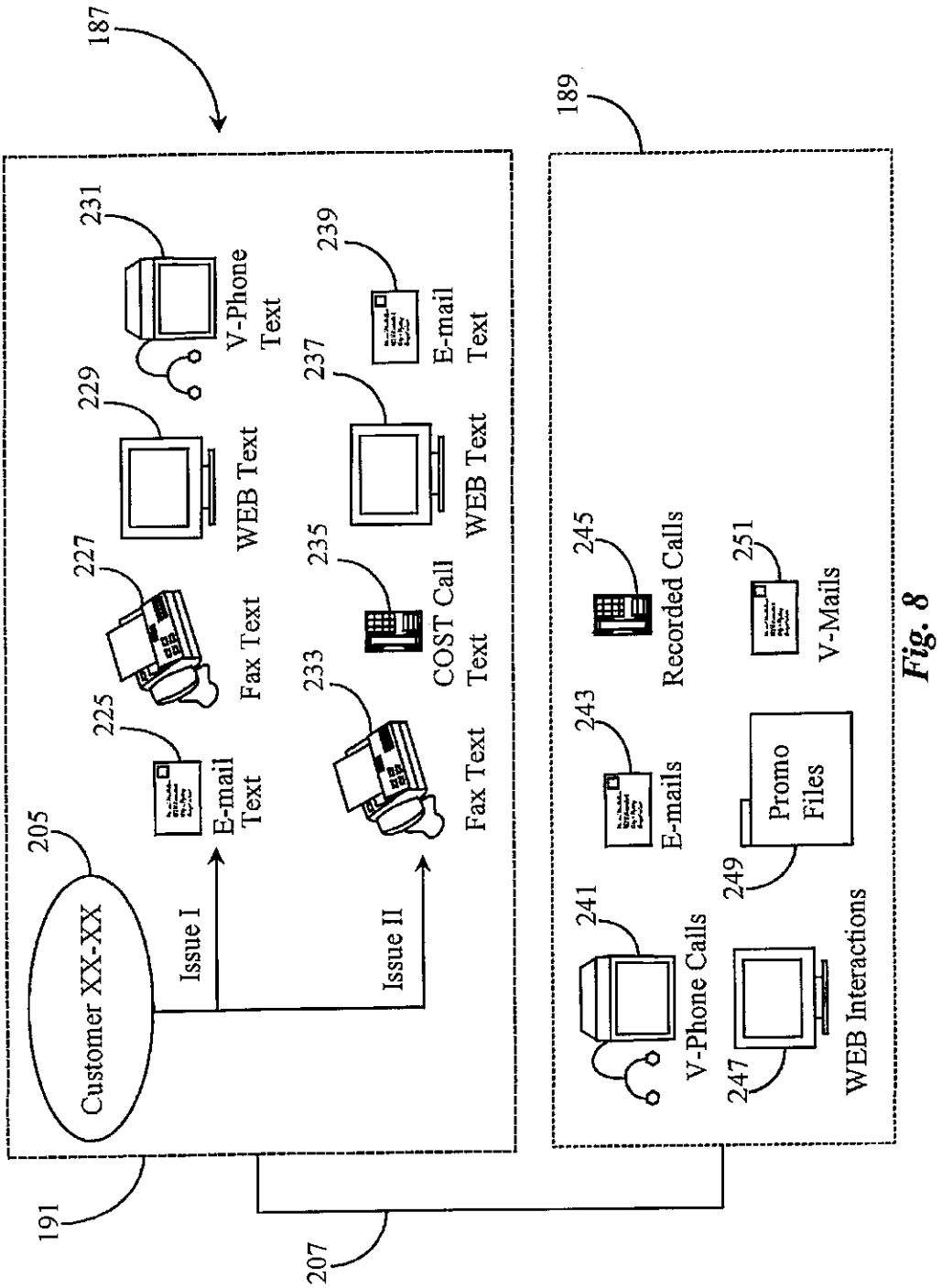

187
189
231
V-Phone
Text
239
E-mail
Text
229
WEB Text
237
WEB Text
227
Fax Text
235
COST Call
Text
225
E-mail
Text
233
Fax Text
205
Customer XX-XX
Issue I
Issue II
245
Recorded Calls
251
V-Mails
243
E-mails
Promo
Files
241
V-Phone Calls
249
247
WEB Interactions
191
207

Fig. 8

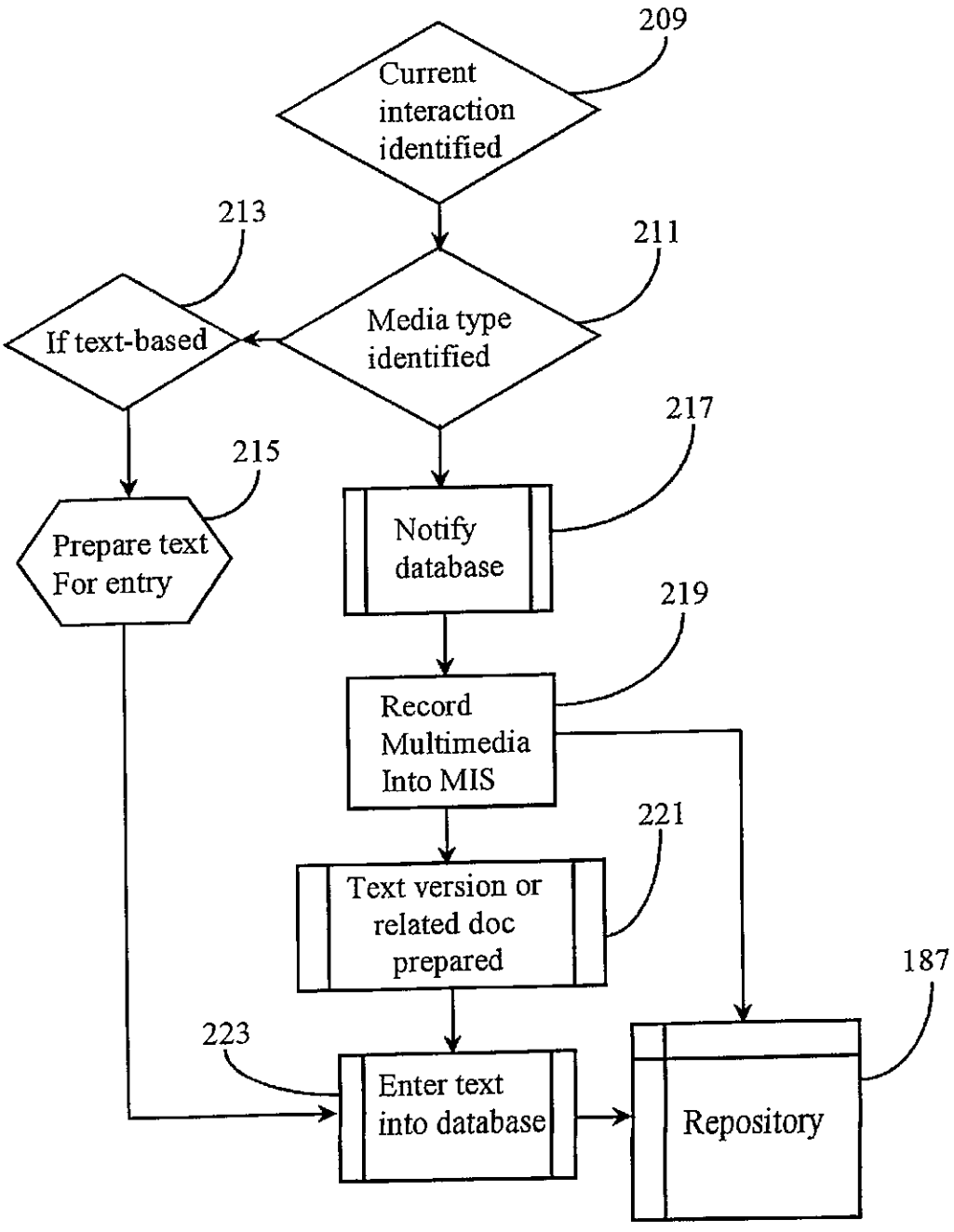

209
Current interaction identified
213
211
If text-based
Media type identified
217
215
Prepare text For entry
Notify database
219
Record Multimedia Into MIS
221
Text version or related doc prepared
187
223
Enter text into database
Repository

Fig. 9

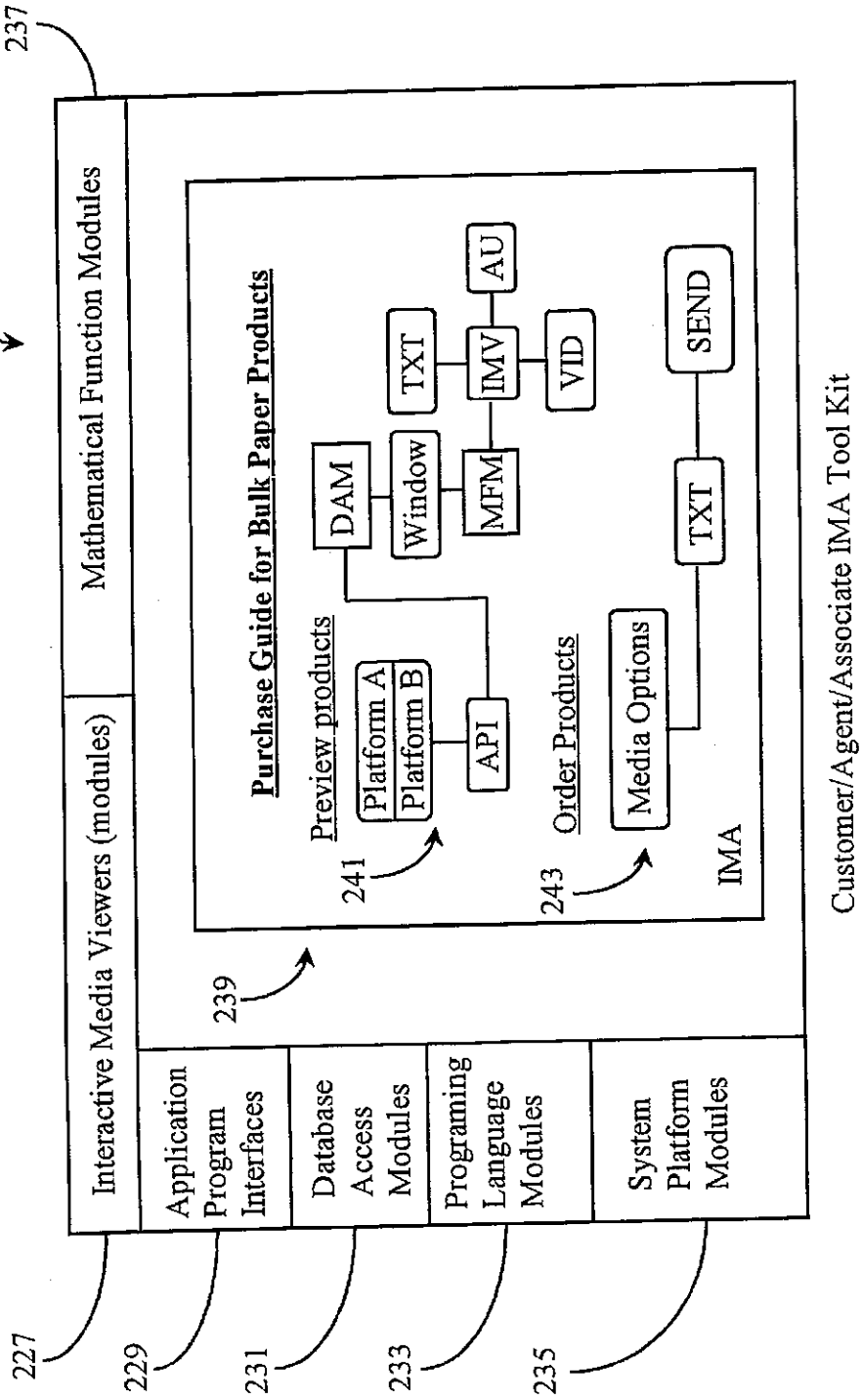

225
237
Interactive Media Viewers (modules)
Mathematical Function Modules
Application Program Interfaces
Database Access Modules
Programing Language Modules
System Platform Modules
227
229
231
233
235
239
Purchase Guide for Bulk Paper Products
Preview products
241
Platform A
Platform B
API
DAM
Window
MFM
TXT
IMV
AU
VID
Order Products
243
Media Options
TXT
SEND
IMA
Customer/Agent/Associate IMA Tool Kit

Fig. 10

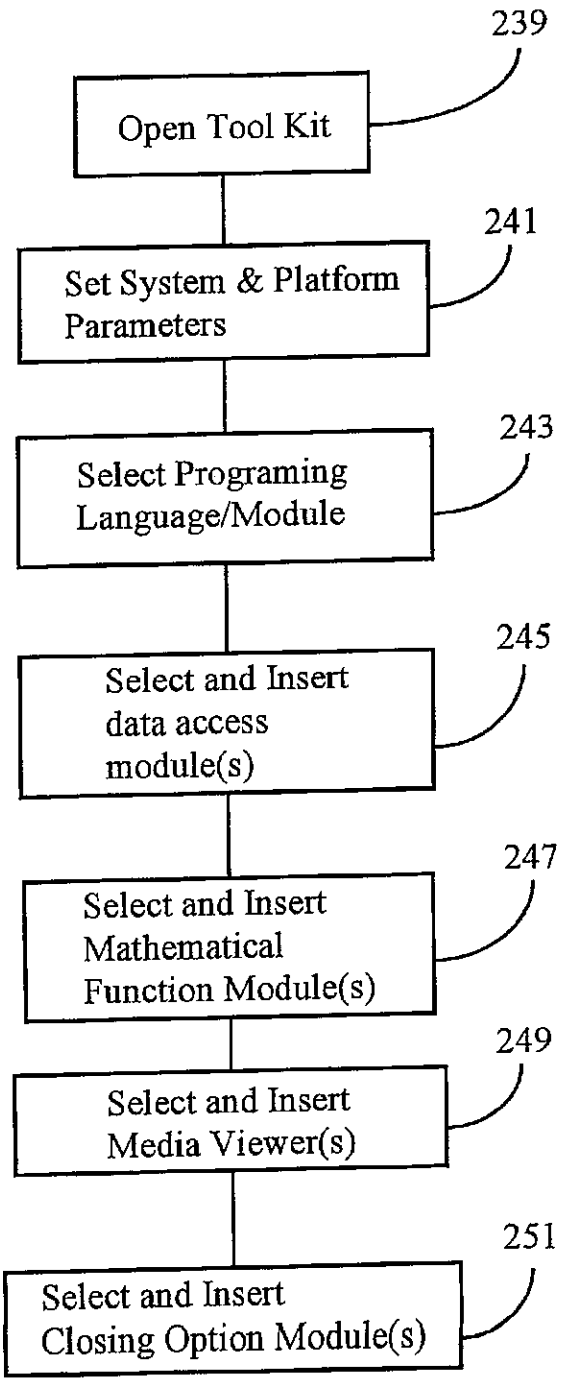

239
Open Tool Kit
241
Set System & Platform Parameters
243
Select Programing Language/Module
245
Select and Insert data access module(s)
247
Select and Insert Mathematical Function Module(s)
249
Select and Insert Media Viewer(s)
251
Select and Insert Closing Option Module(s)

Fig. 11

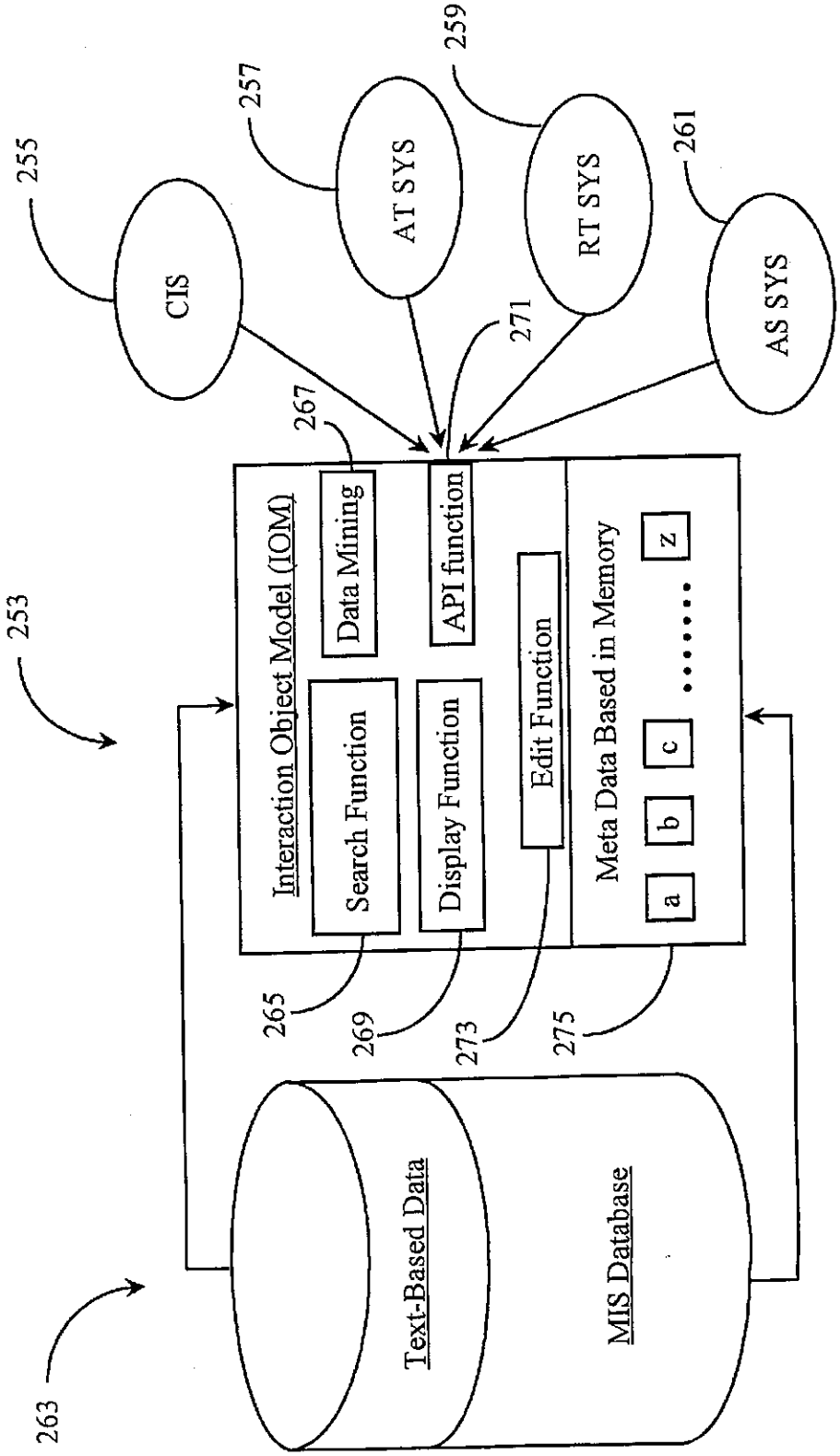

255
257
259
261
CIS
AT SYS
RT SYS
AS SYS
271
267
253
Interaction Object Model (IOM)
Data Mining
API function
Search Function
Display Function
Edit Function
Meta Data Based in Memory
a
b
c
z
265
269
273
275
Text-Based Data
MIS Database
263

Fig. 12

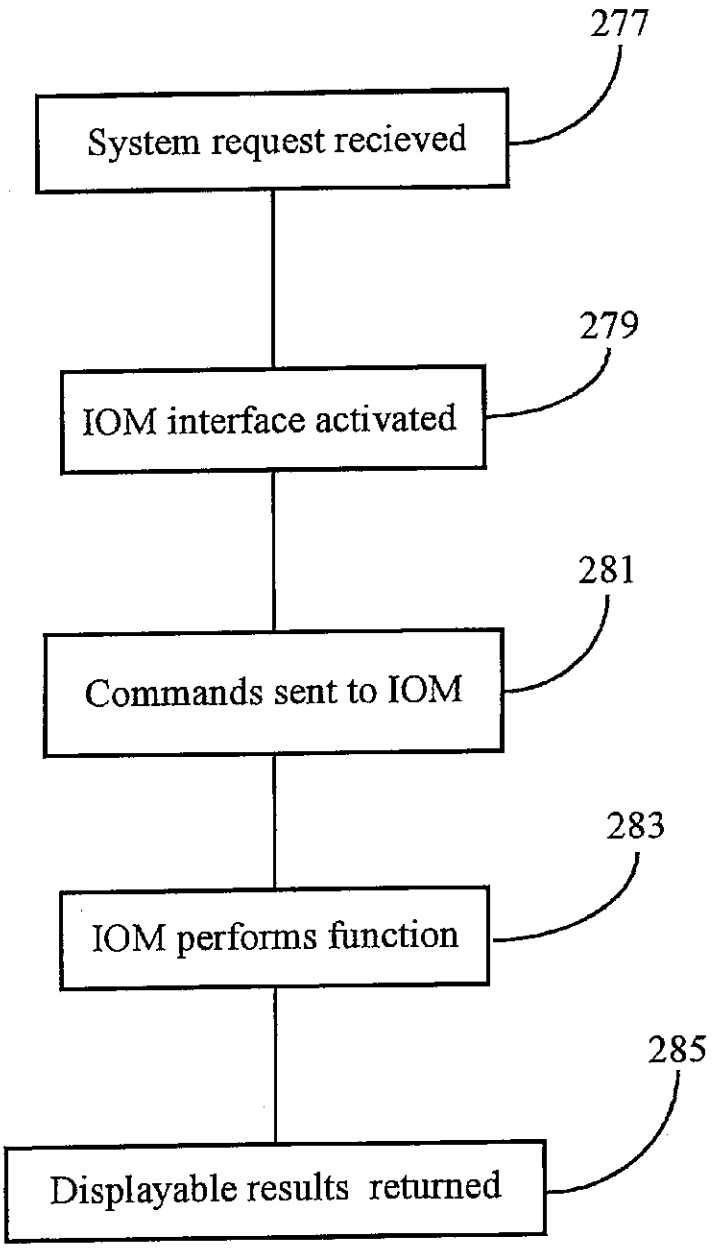
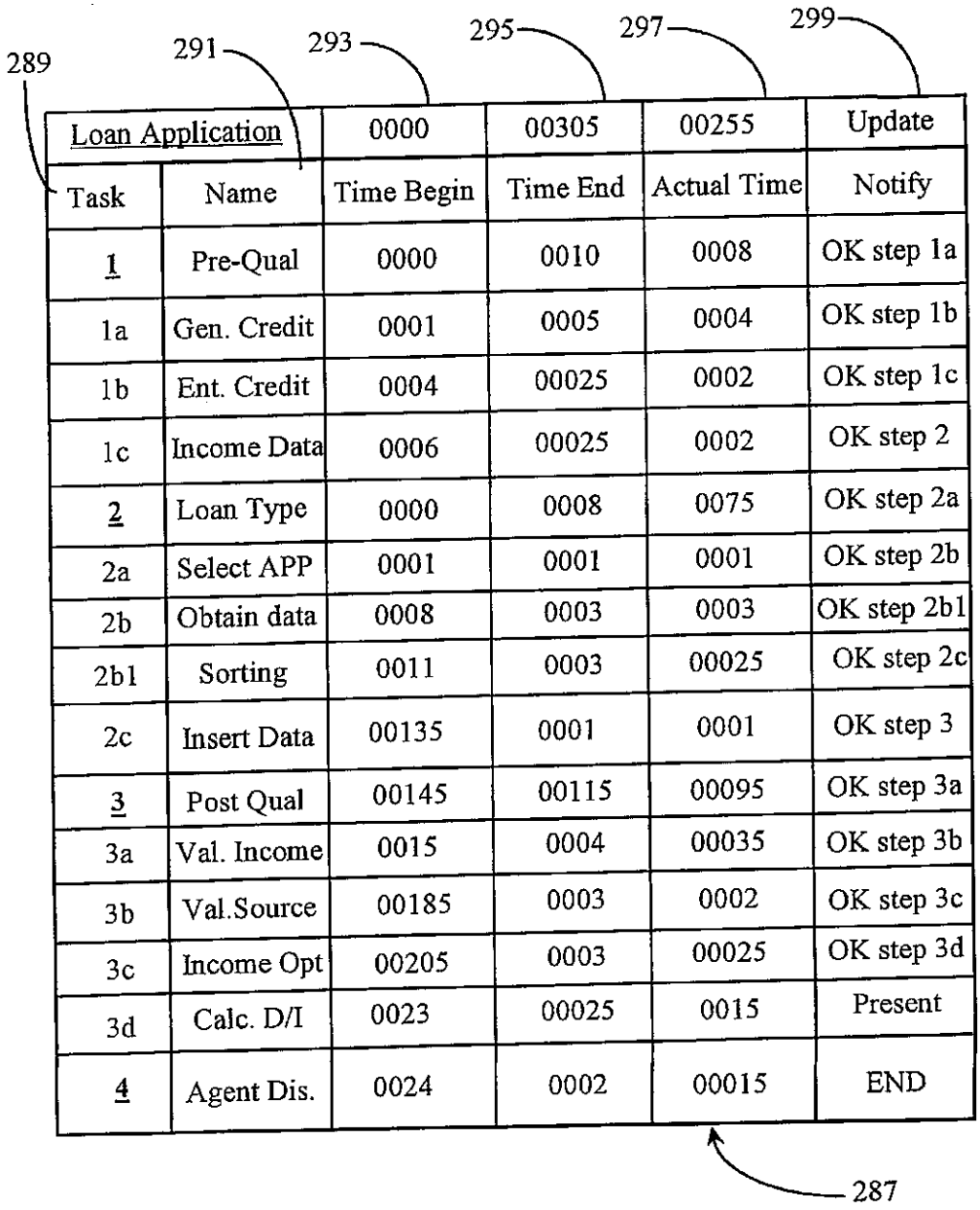

277
System request recieved
279
IOM interface activated
281
Commands sent to IOM
283
IOM performs function
285
Displayable results returned

Fig. 13



Loan Application		0000	00305	00255	Update
Task	Name	Time Begin	Time End	Actual Time	Notify
1	Pre-Qual	0000	0010	0008	OK step 1a
1a	Gen. Credit	0001	0005	0004	OK step 1b
1b	Ent. Credit	0004	00025	0002	OK step 1c
1c	Income Data	0006	00025	0002	OK step 2
2	Loan Type	0000	0008	0075	OK step 2a
2a	Select APP	0001	0001	0001	OK step 2b
2b	Obtain data	0008	0003	0003	OK step 2b1
2b1	Sorting	0011	0003	00025	OK step 2c
2c	Insert Data	00135	0001	0001	OK step 3
3	Post Qual	00145	00115	00095	OK step 3a
3a	Val. Income	0015	0004	00035	OK step 3b
3b	Val.Source	00185	0003	0002	OK step 3c
3c	Income Opt	00205	0003	00025	OK step 3d
3d	Calc. D/I	0023	00025	0015	Present
4	Agent Dis.	0024	0002	00015	END

Fig. 14

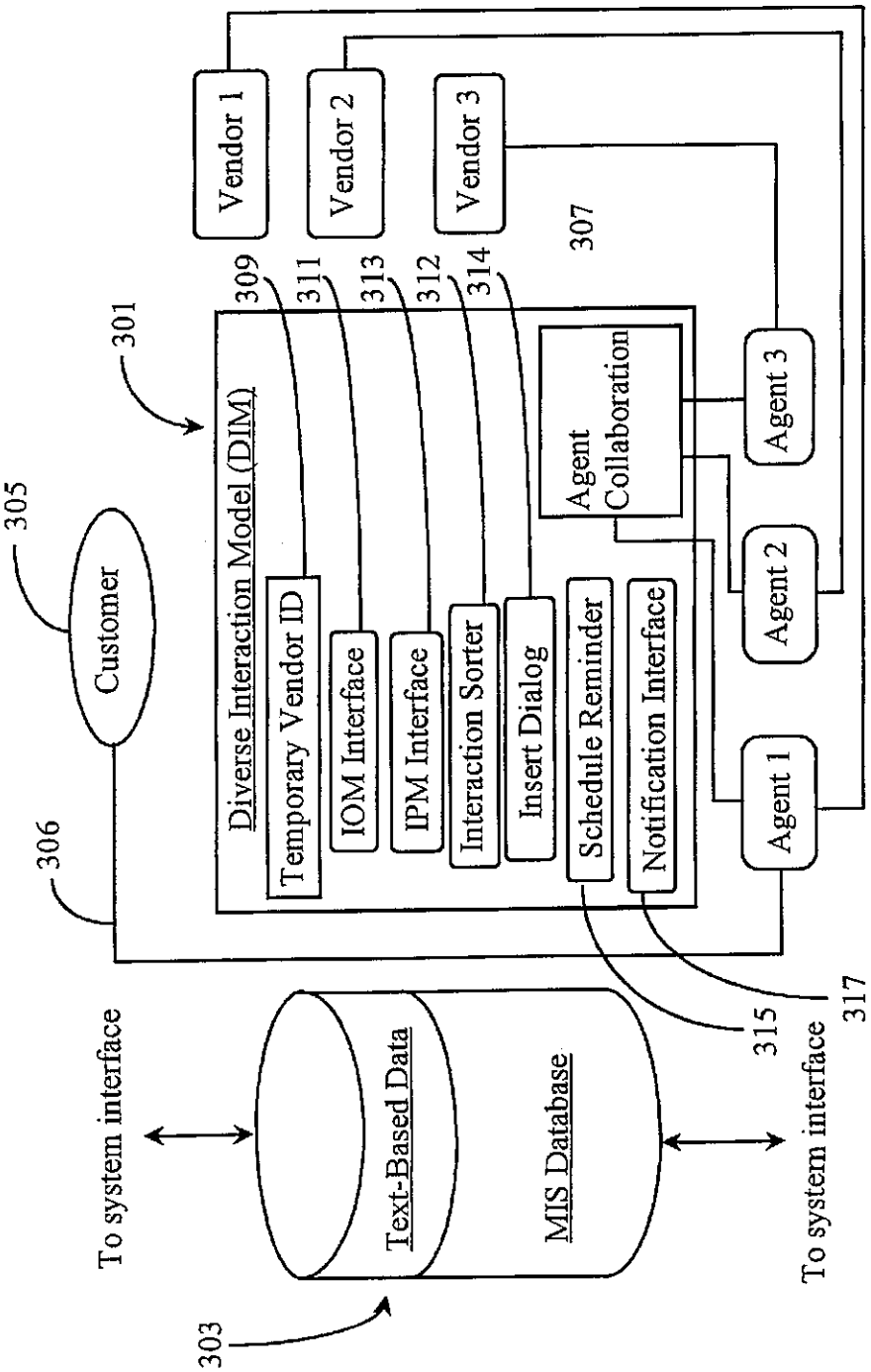

Vendor 1
Vendor 2
Vendor 3
307
309
311
313
312
314
301
Diverse Interaction Model (DIM)
Temporary Vendor ID
IOM Interface
IPM Interface
Interaction Sorter
Insert Dialog
Schedule Reminder
Notification Interface
Agent Collaboration
Agent 3
Agent 2
Agent 1
305
Customer
306
To system interface
Text-Based Data
MIS Database
303
315
317
To system interface

Fig. 15

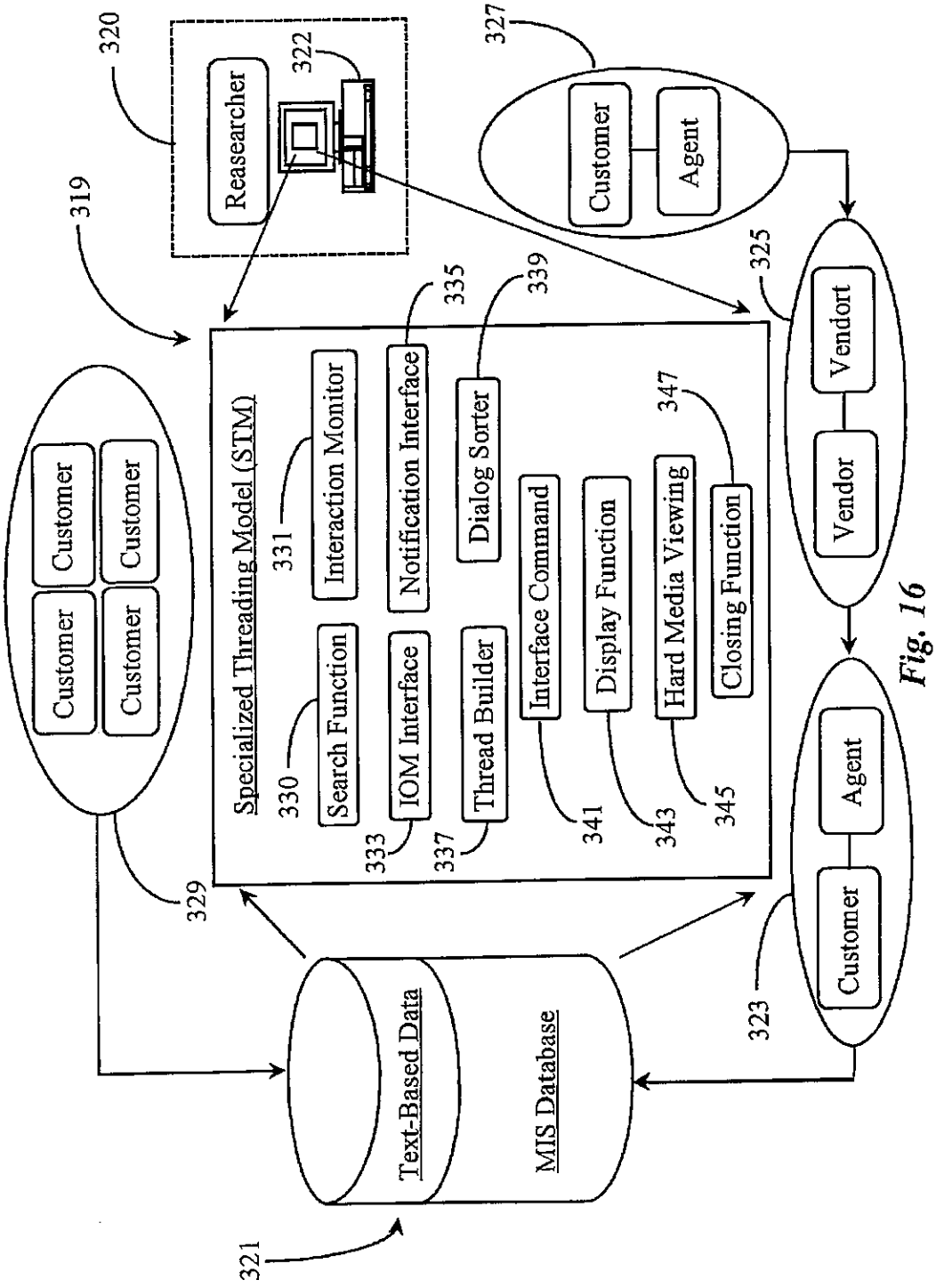

320
Reasearcher
322
327
Customer
Agent
319
325
Vendort
Vendor
Specialized Threading Model (STM)
335
339
347
331
Interaction Monitor
Notification Interface
Dialog Sorter
Customer
Customer
Customer
Customer
330
Search Function
333
IOM Interface
337
Thread Builder
Interface Command
341
Display Function
343
Hard Media Viewing
345
Closing Function
329
323
Customer
Agent
Text-Based Data
MIS Database
321

Fig. 16

METHOD AND APPARATUS FOR CREATING SPECIALIZED MULTIMEDIA THREADS IN A MULTIMEDIA COMMUNICATION CENTER

CROSS-REFERENCE TO RELATED DOCUMENTS

The present application is a continuation-in-part (CIP) of application No. 09/182,937, filed Oct. 29, 1998, now U.S. Pat. No. 6,138,139, application Ser. No. 09/183,395, filed Oct. 29, 1998, application Ser. No. 09/183,551, filed Oct. 29, 1998, application Ser. No. 09/182,745 filed Oct. 28, 1998, application Ser. No. 09/151,429, filed Sep. 11, 1998 application Ser. No. 09/151,710, filed Sep. 11, 1998 and application Ser. No. 09/151,564 filed Sep. 11, 1998, now U.S. Pat. No. 6,108,711, which are incorporated in their entirety by reference.

FIELD OF THE INVENTION

The present invention is in the field of telecommunication encompassing all existing sorts of interaction multimedia technology, and pertains more particularly to methods and apparatus for creating specialized multimedia-threaded dialogs within a multimedia communication-center.

BACKGROUND OF THE INVENTION

In the field of telephony communication, there have been many improvements in technology over the years that have contributed to more efficient use of telephone communication within hosted call-center environments. Most of these improvements involve integrating the telephones and switching systems in such call centers with computer hardware and software adapted for, among other things, better routing of telephone calls, faster delivery of telephone calls and associated information, and improved service with regard to client satisfaction. Such computer-enhanced telephony is known in the art as computer-telephony integration (CTI).

Generally speaking, CTI implementations of various design and purpose are implemented both within individual call-centers and, in some cases, at the telephone network level. For example, processors running CTI software applications may be linked to telephone switches, service control points (SCPs), and network entry points within a public or private telephone network. At the call-center level, CTI-enhanced processors, data servers, transaction servers, and the like, are linked to telephone switches and, in some cases, to similar CTI hardware at the network level, often by a dedicated digital link. CTI processors and other hardware within a call-center is commonly referred to as customer premises equipment (CPE). It is the CTI processor and application software is such centers that provides computer enhancement to a call center.

In a CTI-enhanced call center, telephones at agent stations are connected to a central telephony switching apparatus, such as an automatic call distributor (ACD) switch or a private branch exchange (PBX). The agent stations may also be equipped with computer terminals such as personal computer/video display unit's (PC/VDU's) so that agents manning such stations may have access to stored data as well as being linked to incoming callers by telephone equipment. Such stations may be interconnected through the PC/VDUs by a local area network (LAN). One or more data or transaction servers may also be connected to the LAN that interconnects agent stations. The LAN is, in turn, typically connected to the CTI processor, which is connected to the call switching apparatus of the call center.

When a call arrives at a call center, whether or not the call has been pre-processed at an SCP, typically at least the telephone number of the calling line is made available to the receiving switch at the call center by the network provider. This service is available by most networks as caller-ID information in one of several formats such as Automatic Number Identification (ANI). Typically the number called is also available through a service such as Dialed Number Identification Service (DNIS). If the call center is computer-enhanced (CTI), the phone number of the calling party may be used as a key to access additional information from a customer information system (CIS) database at a server on the network that connects the agent workstations. In this manner information pertinent to a call may be provided to an agent, often as a screen pop on the agent's PC/VDU.

In recent years, advances in computer technology, telephony equipment, and infrastructure have provided many opportunities for improving telephone service in publicly-switched and private telephone intelligent networks. Similarly, development of a separate information and data network known as the Internet, together with advances in computer hardware and software have led to a new multimedia telephone system known in the art by several names. In this new systemology, telephone calls are simulated by multimedia computer equipment, and data, such as audio data, is transmitted over data networks as data packets. In this system the broad term used to describe such computer-simulated telephony is Data Network Telephony (DNT).

For purposes of nomenclature and definition, the inventors wish to distinguish clearly between what might be called conventional telephony, which is the telephone service enjoyed by nearly all citizens through local telephone companies and several long-distance telephone network providers, and what has been described herein as computer-simulated telephony or data-network telephony. The conventional systems are referred to herein as Connection-Oriented Switched-Telephony (COST) systems, CTI enhanced or not.

The computer-simulated, or DNT systems are familiar to those who use and understand computers and data-network systems. Perhaps the best example of DNT is telephone service provided over the Internet, which will be referred to herein as Internet Protocol Network Telephony (IPNT), by far the most extensive, but still a subset of DNT.

Both systems use signals transmitted over network links. In fact, connection to data networks for DNT such as IPNT is typically accomplished over local telephone lines, used to reach points in the network such as an Internet Service Provider (ISP). The definitive difference is that COST telephony may be considered to be connection-oriented telephony. In the COST system, calls are placed and connected by a specific dedicated path, and the connection path is maintained over the time of the call. Bandwidth is basically assured. Other calls and data do not share a connected channel path in a COST system. A DNT system, on the other hand, is not dedicated or connection-oriented. That is, data, including audio data, is prepared, sent, and received as data packets over a data-network. The data packets share network links, and may travel by varied and variable paths.

Recent improvements to available technologies associated with the transmission and reception of data packets during real-time DNT communication have enabled companies to successfully add DNT, principally IPNT, capabilities to existing CTI call centers. Such improvements, as described herein and known to the inventor, include methods for guaranteeing available bandwidth or quality of service

(QoS) for a transaction, improved mechanisms for organizing, coding, compressing, and carrying data more efficiently using less bandwidth, and methods and apparatus for intelligently replacing lost data via using voice supplementation methods and enhanced buffering capabilities. In addition to Internet protocol (IPNT) calls, a DNT center may also share other forms of media with customers accessing the system through their computers. E-mails, Video mails, fax, file share, file transfer, video calls, and so forth are some of the other forms of media which may be used. This capability of handling varied media leads to the term multimedia communications center. A multimedia communications center may be a combination CTI and DNT center, or may be a DNT center capable of receiving COST calls and converting them to a digital DNT format. The term communication center will replace the term call center hereinafter in this specification when referring to multimedia capabilities.

In typical communication centers, DNT is accomplished by Internet connection and IPNT calls. For this reason, IPNT and the Internet will be used in examples to follow. IT should be understood, however, that this usage is exemplary, and not limiting.

In systems known to the inventors, incoming IPNT calls are processed and routed within an IPNT-capable communication center in much the same way as COST calls are routed in a CTI-enhanced call-center, using similar or identical routing rules, waiting queues, and so on, aside from the fact that there are two separate networks involved. Communication centers having both CTI and IPNT capability utilize LAN-connected agent-stations with each station having a telephony-switch-connected headset or phone, and a PC connected, in most cases via LAN, to the network carrying the IPNT calls. Therefore, in most cases, IPNT calls are routed to the agent's PC while conventional telephony calls are routed to the agent's conventional telephone or headset. Typically separate lines and equipment must be implemented for each type of call weather COST or IPNT.

Due in part to added costs associated with additional equipment, lines, and data ports that are needed to add IPNT capability to a CTI-enhanced call-center, companies are currently experimenting with various forms of integration between the older COST system and the newer IPNT system. For example, by enhancing data servers, interactive voice response units (IVR's), agent-connecting networks, and so on, with the capability of conforming to Internet protocol, call data arriving from either network may be integrated requiring less equipment and lines to facilitate processing, storage, and transfer of data.

With many new communication products supporting various media types available to businesses and customers, a communication center must add significant application software to accommodate the diversity. For example, e-mail programs have differing parameters than do IP applications. IP applications are different regarding protocol than COST calls, and so on. Separate routing systems and/or software components are needed for routing e-mails, IP calls, COST calls, file sharing, etc. Agents must then be trained in the use of a variety of applications supporting the different types of media.

Keeping contact histories, reporting statistics, creating routing rules and the like becomes more complex as newer types of media are added to communication center capability. Additional hardware implementations such as servers, processors, etc. are generally required to aid full multimedia communication and reporting. Therefore, it is desirable that interactions of all multimedia sorts be analyzed, recorded, and routed according to enterprise (business) rules in a manner that provides seamless integration between media types and application types, thereby allowing agents to respond intelligently and efficiently to customer queries and problems.

In addition to identifying and recording communication center interactions. It is desirable that threaded dialogs of such interactions be created and made available in a contact history for latter review. In systems known to the inventor, such dialog threading is practiced and includes a unique multimedia capability wherein threaded dialog may be cross-referenced to the actual media accounts. The inventor knows of no prior art network operating systems wherein multimedia threading is practiced.

The multimedia threading capability as practiced in a customer interaction network operating system (CINOS), as known to the inventor, supports conventional interaction (normal one on one primary dialog) and diverse interaction (related third party and multi-party dialogs comprising secondary dialog). These dialogs may be organized and placed on a customer or issue-specific thread, or an attatched hidden thread according to enterprise rules. Hence, any interaction related to a customer or specific transaction or issue may be logically stored and recorded.

Reviewing a contact history comprising such identified and organized dialog threads is vastly more efficient and meaningful than is the case with prior art systems that do not support multimedia or diverse dialog paths. However, since the dialog threads mentioned above are customer or issue specific meaning that only related dialogs and media are associated with the threads, it is still difficult to perform many other types of research that might be useful in a multimedia communication center. For example, it is desirable for an enterprise engaged in selling various computer components to track the customer satisfaction level related to the purchase and installation of one particular product such as a particular disk drive. It may be that the disk drive under scrutiny is introductory and success or failure of it's popularity will determine future production requirements.

It would be desirable under such circumstances to be able to create and review a specialized dialog thread containing all past and recent dialogs associated with the particular drive, even if the main theme of such dialogs is unrelated to the disk drive. Such capability exceeds dialog association methods taught with respect to systems known to the inventor and requires further innovation and invention.

What is clearly needed is a method and apparatus for creating specialized dialog threads about a specific predefined issue or issue set that will link a plurality of otherwise unrelated dialogs by utilizing previously stored data and current interaction dialog. Such a capability needs to extend to both stored transaction data and to real-time interactions. Such specialized threads or associations may aid in research to improve communication center efficiency.

SUMMARY OF THE INVENTION

In a preferred embodiment of the present invention, in a multimedia call center (MMCC) supporting multiple channels and forms of communication and storing call center transactions in a data repository, a threading software application is provided, comprising a programming input for a user to enter association criteria; an access function that accesses at least stored data in the data repository; a search function that searches accessed data for association criteria, and notes those data entities that meet the association

criteria; and a display function that display at least indicators of data entities meeting the association criteria.

In a preferred embodiment the display function displays icons for data entities, the icons arranged in threads or tree structures. The icons may be interactive icons that, being selected, invoke and render the data associated with the icon. Further, the association criteria may comprise individual and combinations of key words, phrases, text strings, date of occurrence, time of occurrence, media type, participant characteristics, duration of interaction, and participant initiation.

In some embodiments the access function allows access to stored data and also an ability to monitor transactions occurring in real time. The real time transactions may comprise connection-oriented switched telephony (COST) calls, data network telephony (DNT) calls, including Internet Protocol (IP) calls, facsimiles, e-mails, voice mails, and WEB document interactions.

The application in embodiments of the invention may further comprise a programmable alert function that alerts one or more of persons associated with the MMCC according to programmed alert criteria.

In other aspects of the invention methods are taught for mining data in such a call center, and associating data according to a broad range of criteria, enabling researchers and auditors, and the like, to discover interesting and valuable facts about a host enterprise and business conducted that might not otherwise come to light. These and other aspects of the invention are taught in enabling detail below.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. **1** is a diagram of a multimedia communications center enhanced with a network operating system according to an embodiment of the present invention.

FIG. **2** is a block diagram illustrating basic layers of a customer interaction operating system according to an embodiment of the present invention.

FIG. **3** is a flow chart illustrating basic steps performed by the network operating system of FIG. **2** related to completing interactive transactions between business partners.

FIG. **4** is a block diagram illustrating agent-desktop function according to an embodiment of the present invention.

FIG. **5** is a block diagram of an exemplary WEB-form customer interface according to an embodiment of the present invention.

FIG. **6** is a flow chart illustrating media-presentation and customer-interface logic steps according to an embodiment of the present invention.

FIG. **7** is an exemplary overview of a multimedia interaction storage system within a communication center according to an embodiment of the present invention.

FIG. **8** is a block diagram of the repository of FIG. **7** illustrating threaded text-blocks and their relationship to stored multimedia according to an embodiment of the present invention.

FIG. **9** is a process flow chart illustrating logical steps taken when building a threaded multimedia contact-history of communication-center interactions according to an embodiment of the present invention.

FIG. **10** is a block diagram illustrating an interactive multimedia application (IMA) tool kit and a created application according to an embodiment of the present invention.

FIG. **11** is a process flowchart illustrating logical steps for building an IMA for a user interacting with CINOS according to an embodiment of the present invention.

FIG. **12** is a block diagram illustrating the relationship between a mass repository, an interaction object model (IOM interface), and data-interaction systems according to an embodiment of the present invention.

FIG. **13** is an exemplary flow chart illustrating interactive steps associated with IOM functionality according to an embodiment of the present invention.

FIG. **14** is a Gant table illustrating a pre-defined business process as executed via an interface engine according to an embodiment of the present invention.

FIG. **15** is a block diagram illustrating functionality of a diverse interaction model according to an embodiment of the present invention.

FIG. **16** is a block diagram illustrating functionality of an exemplary specialized threading model according to an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** is a multimedia communications center enhanced with a network operating system according to an embodiment of the present invention. A telephony-network architecture **11** comprises an enterprise-hosted communication center **17** that is linked to, in this example, both a publicly-switched telephone network (PSTN) **13**, and a wide area network (WAN) **15**, which may be the public Internet or other digital network, such as a company Intranet.

In this particular embodiment communication center **17** handles both conventional telephone calls, which may be categorized as connection oriented switched telephony (COST) calls, and data network telephony (DNT) calls, which may be DNT calls over a private digital network or calls according to a protocol such as the well-known Internet protocol. DNT calls are characterized in that data is transmitted as addressed data packets as opposed to dedicated connections in COST calls. As indicated, PSTN **13** may be a private rather than a public network. WAN **15** may be a company Intranet, the Internet, or another type of WAN known in the art. The particular method of call delivery and call center integration is not particularly relevant for the purposes of this invention. There are many ways known both to the inventor as well as known in the art. Particular issues discussed in the disclosure between the telephones and the computers might be implemented differently depending on the actual system, but shall be deemed equivalent for all purposes of this invention.

Incoming COST calls arrive at a network-level telephony switching apparatus **19** in network cloud **13** and are connected over trunk **23** to a central telephony switching apparatus **27** within communication center **17**. From switching apparatus **27**, calls are routed according to existing routing rules over internal wiring **56** to agents' telephones **47**, **49**, **51**, and **53** residing at agents' workstations **31**, **33**, **35**, and **37** respectively.

Incoming DNT calls, and other communication events such as e-mail, file transfers and the like, arrive at a routing node **21** in WAN **15** and are passed on over digital connection **25** to a routing server **29** within communication center **17**. Once calls arrive at server **29**, they may, in some embodiments, be routed directly over LAN **55** according to existing routing rules to personal computer/video display units (PC/VDU) such as PC/VDU **39**, **41**, **43**, or **45** located at agent's workstations **31**, **33**, **35**, and **37** respectively.

In this embodiment, switch-connected telephones **47–53** are also connected to PC/VDU's **39–45** via a headset to computer sound-card according to technique known to the inventor and accomplished via an I/O cable. Thus connected, agents may respond to incoming COST and DNT calls with the same headset.

In the exemplary system and communication center shown, the equipment and applications are adapted to provide for multimedia operation at each of the agent stations, so the agents can interact with clients in many different ways, as are known in the multimedia arts.

Computer telephony integration (CTI) enhancement is, in this embodiment, provided both at communication center **17** and in PSTN **13**. For example, in PSTN **13**, a processor **61** running instances of a CTI application known as a T-server (TS) to the inventors, and a statistics server (Stat) is connected to telephony switch **19** via CTI link **65**. An intelligent peripheral **59** of the form of an interactive voice response unit (IVR) is connected to processor **61** via data connection **63**. Similar CTI equipment is illustrated within communication center **17**. Namely, a processor **67** running instances of TS and Stat and connected to telephony switch **27** via CTI link **71**, and an IVR **69** connected to processor **67** via a data connection **73**, with processor **67** further connected to a local area network (LAN) **55** within communication center **17**.

In alternative embodiments there may also be a CTI processor **22** in WAN **15** connected to server **21** by a CTI link **24**. Also in some embodiments a separate data network **66** connects these CTI processors. In this way, intelligent routing may be performed at the network level with negotiation and direction from within communication center **17**.

It will be appreciated by those with skill in the art that the CTI enhancements, as immediately described above, may be hosted on one processor at PSTN **13** and on one processor at communication center **17** without departing from the spirit and scope of the present invention. The inventor has chosen to show separate processors having separate functions for exemplary purposes only. It will also be appreciated by the skilled artisan that there may be many more or fewer than the four agent stations shown in communications center **17**, and hardware and software arrangements may be made is a variety of ways. Also, home agents might be connected in a variety of ways to the call center.

In a preferred embodiment of the present invention, a customer-interaction network operating system, hereinafter termed (CINOS), is provided for the purpose of managing communications center **17**, and optimizing and recording all agent/customer interactions received at communication center **17** from networks **13** and **15**. CINOS is unique in the fact that it is a multi-tiered object-and process-orientated system wherein logic regarding the various aspects of it's functionality is achieved via knowledge-based architecture and object modeling. Various functions of CINOS, more fully described below, include capturing (recording), analyzing, routing, and, in many instances, responding via automated process to customers engaged in interactions with the enterprise (company hosting the communication center). CINOS is adapted to support all planned communication mediums such as multimedia DNT applications including e-mail, video mail, file transfers, chat sessions, IP calls, and CTI COST transactions such as voice calls, voice mails, faxes, and so on.

Referring back to FIG. **1**, CINOS utilizes various LAN-connected machines in order to perform various operations. Among these various hardware implementations are a multimedia server (MIS) **79** adapted to physically store and serve all multimedia transactions, and a customer-information-system server (CIS) **57** adapted to physically store and serve information relevant to customers such as purchase history, financial status, product preferences, contact information, etc. A central server (COS) **77** acts as a host location for a CINOS manager application (noted in text balloon) which is, in effect, the parent application that controls all of the operation and functionality of the system.

In addition to the above-mentioned machines hosting CINOS routines, each PC/VDU such as PC/VDU **39**, for example, has a CINOS-agent desktop interface or client application (not shown) adapted to interact with the parent application. Also, each machine that provides particular dedicated function to communication center **17** such as switch-connected CTI processors, IVR's, and other related equipment host instances of CINOS application-program interfaces (API's) to enable seamless integration of differing parameters and/or protocols that are used with various planned application and media types utilized within communication center **17**. Such programs may also co-reside or be in any combination or hosted by themselves. Additionally, for performance purposes, additional dedicated network links may exist between those servers, but essentially they are only performance boosters, and hence for clarity purposes, only a simple network is shown.

As previously described, CINOS comprises a multi-tiered architecture. This unique architecture comprises an external media layer for interfacing with the customer or business contact, a workflow layer for making routing decisions, organizing automated responses, recording transactions, and so on, and an internal media later for interfacing and presenting interactions to an agent or knowledge worker. An innovative concept associated with CINOS involves the use of tooled process models, knowledge bases, and other object models as base instruction for it's various functions. These modular conventions may be inter-bound with each other, and are easily editable providing a customizable framework that may conform to virtually any existing business logic.

In simple operation, and after any network level routing, COST calls and DNT calls including other media events arrive at communication center **17** to telephony switch **27**, and routing server **29** respectively. Network level routing, as defined herein, includes any intelligent implementation that may be in place and aided via processors **59**, **61**, and **22**. Load balancing to multiple communication centers, and transferring customer data obtained at network-level over data-network connection **66** would be examples of such network-level routing.

Once a call or other communication event registers at either switch **27** or routing server **29**, CINOS immediately identifies the media type associated with the call and begins it's processes depending on enterprise rules. For example, a live COST call may first be routed to IVR **69** whereby the customer can be presented with varying choices such as leaving a voice message, waiting in queue, receiving a call back, or perhaps an e-mail, and so on. Interaction by IVR **69**, in this instance, will preferably be via voice recognition technique such as is known in the art, but may also be via touch tone response or other known method. As previously described, the caller may elect from a number of options, such as to hold for a next available agent, select an automated response such as a fax back, or perhaps a later agent-initiated response such as an e-mail or call back. In all cases, CINOS seamlessly processes and executes the logic required to accomplish the goal of the caller in a media and application-independent fashion.

DNT events are handled much the same way as described above for live callers. For example, an IP call may be routed

to a digital equivalent of an IVR for interaction or queued for a next available agent, and so on. In one embodiment, IVR **69** may be adapted to handle both COST and DNT interaction.

All interactions with live external media, including actual text-based events whether live or not, are recorded and stored in MIS **79** with an associated text version of the media stored as well, and becoming part of an overall threaded contact history. This is accomplished in varying ways according to existing parameters such as media type, whether the event is a live call, and so on. For example, CINOS may execute a command directing IVR **69** to digitally record an incoming COST call during customer interaction and then store the voice recording of the transaction in MIS **79**. A text version of the recording either created simultaneously from the voice recording via voice-to-text techniques (known in the art), or created by a live attendant via manual annotation may be sent to and stored in DB **79**. An IPNT call arriving at routing server **29** may be similarly recorded and stored in MIS **79** with an associated text version of the interaction stored in DB **79**. E-mails, video calls, voice mails and so on are similarly handled. For example, an incoming e-mail is stored in MIS server **79** while text from the e-mail may be extracted and stored associated with the e-mail.

The purpose of the text version of the event is twofold. Firstly, a complete text-based transaction history of communication center **17** may be compiled and reserved for later access and audit. Secondly, an agent or knowledge worker may, in some instances, see the text version of the event at the same time that he receives routed notification of the event. In this way, an agent may begin mental preparation before taking a call. The text version of an event must be machine-readable and human readable at times displayed. Interactive media-independent viewers, part of the agent's client application, may be used to disseminate information which may initially not be human readable.

It is important to note here that the text-based version of an event may or may not be a complete and verbatim rendition of an actual media event. For example, an e-mail may contain many documents each having many pages of text. Therefore, the text-based version of a particular e-mail event may simply contain the name and particulars regarding the author, a purchase order, and a list of the enclosed documents by title, and basic content or memo as well as a possible manual annotation. The attachments to the e-mail may be stored separately, and be also cross-indexed and retrievable. Seeing the purchase order when the event is routed to an agent desktop tells the agent that this e-mail is important.

A fax, stored originally as a bit-mapped document, may be converted to text in the system via optical recognition (OCR) technique wherein sometimes only certain content such as the authors contact information, basic intent of the fax, and perhaps special numbers or codes contained in the original fax are recorded in a text version **79**, sometimes the whole text is OCR'd, while the original fax is stored in it's entirety in DB **79**. Such codes or numbers that are specifically parsed from actual media may be part of a unique coding system set up by the enterprise whereby customers are directed to include such codes or numbers with their orders, service requests, and so on.

Parsing text messages is accomplished via a text-analyzer known to the inventor. In other non-text media types, such as video or graphics, descriptive notes may be taken via live attendant and stored in DB **79** as previously mentioned. Voice recognition technology may also be used in a case of recorded sound or video with sound. All transactions regardless of media type are thus recorded and stored according to enterprise rules with at least a meaningful part of the content if not all of the content of such transactions converted to text and stored in DB **79** associated with the recording of the event. Again, the importance of the text version is that the extracted knowledge of the transaction therein is in machine-operable code, allowing search and cross-referencing functions that may otherwise not be possible.

After incoming events are analyzed and processed with regards to queuing, recording, storing, etc. CINOS decides the disposition paths of each event. For example, live calls in queue are routed to live agents if available, if this is the priority action in the enterprise rules. E-mails are either routed to next available agents using a push technology, or simply stored in MIS server **79** where they may be retrieved by agents after receiving notification. Recorded events such as IVR voice requests are stored in MIS server **79** where they may be retrieved by agents, and so on.

By the use of routing and routing notification events, any media may be routed to an appropriate agent based on skill, or any other rule-based routing method over LAN **55**. Actual multimedia events may be accessed from MIS server **79** at the agent's discretion, or by rule, and text-based versions of those events stored in DB **79** may be mirrored and routed to the agent along with notification of the incoming event.

Other services may be performed by CINOS such as responding to media requests without agent participation via initiating automated fax responses, out-bound dialing campaigns wherein recorded information is given to a customer perhaps concerning an order placed by the customer, and so on. Networking via business or chat applications between several business partners, customers, agents, and so on, is possible wherein each entry may be stored in DB **79** as part of a discussion thread including responses of another media type, perhaps initiated by a communication-center agent to one of the participants during the discussion.

As a general rule, full multimedia storage is done in a mass storage server, and linked by cross-indexing to the database. Depending on the business model, full text or only partial annotation is stored in the database, or a mix therof, e.g by media type.

In addition to supporting a wide variety of applications and protocol, CINOS is provided with the tools for building media-independent self-help wizards that are adapted for problem solving and reduction. Similarly, external and internal interaction media viewers are provided and adapted to support any media of choice.

CINOS uses object modeling and linking techniques that are known in the art to effect much of it's goal of presenting a seamless customer interaction with an enterprise agent or knowledge worker operating in a communication center such as center **17**. For example, an interaction object model (IOM) represents a transcript of all interaction history stored in DB **79** and provides an audit trail of the state of transactions of all interactions. An interaction process model (IPM) controls how events are handled within the operating system.

An additional set of models handle how agents receive their routed media such as via traditional push model, blended push model, publish and subscribe model, or interrupt model. Prioritizing interaction events may also be accomplished through varying the push theme or scheme. For example, traditional push technology for e-mail means that only e-mail (media type) is being worked on by an

agent. By blending the push model with a publish and subscribe model, the interrupt model is created wherein the agent may subscribe to various routed media such as answering phones, and responding to faxes, but may be interrupted for an important interaction of another media type such as e-mail and so on. In this way an agent's time may be utilized according to enterprise rules within an automated environment.

Outbound campaigns may be configured according to enterprise rules and media preference using a single rule-set knowledge-base. This single set of outbound tools can be used to initiate customer dialog via predictive dialing, e-mail push, automated recorded messages, and so on.

It will be apparent to those with skill in the art that common object modeling (COM) can be used to create virtually any type of model for any type of enterprise situation. It is the intention of the inventor to provide the applicable control codes known in the art for building process and object models and enabling the linking and interaction between the models. As previously described, it is partly the fact that CINOS uses these various models and knowledge bases to achieve desired interaction that sets it above current-art systems. The inventor knows of no such network interfacing operating system that is based on the above described technology.

CINOS may be implemented in a number of different topologies. For example, CINOS may be implemented as a centralized topology with one communication center as shown here in FIG. 1, a distributed topology wherein a single communication center may span multiple physical locations, a segmented communication center wherein a single pool of agents services more than one company or customer base, or a wide communication network wherein a plurality of communication centers such as center 17 cooperatively service a common pool of customers or a customer base. Enterprises involved in commerce such as large financial institutions hosting many geographically separate communication centers may build their entire networking system using CINOS architecture in standardized and distributed fashion. There is no limitation to the type of enterprise that may use CINOS as it may be tooled to accommodate virtually any network architecture linked to a communication center having DNT capability.

It will also be apparent to one with skill in the art that CINOS routines according to various embodiments of the present invention may be included and implemented at the network level without departing from the spirit and scope of the present invention such as in processor 61, and IVR 59 in PSTN 13, or in routing node 21 in WAN 11.

FIG. 2 is a block diagram illustrating basic layers of the network operating system according to an embodiment of the present invention. As previously described with reference to FIG. 1, CINOS comprises three basic operating layers. They are an external media layer 83, a workflow layer 85, and an internal media layer 87. External media layer 83 interfaces directly with the customers or business contacts or partners as illustrated via customers a and b, and business contact c. The bi-directional arrows beneath each of the above mentioned participants illustrate interactive participation with CINOS on the customer side.

External media layer 83 may, in one embodiment, be a multifaceted, web-based self-help interface providing news information and a host of other services that may be personalized by the customer. In many respects, external media layer 83 in this embodiment is similar to a web browser.

Workflow layer 85 comprises 3 basic function categories beginning with a content analysis category 89 wherein textual analysis, voice analysis, IVR interaction, recording and storing takes place. A next category is context resolution 91. Context resolution involves customer identification, business process binding, preparation for routing, and so on. A third category termed interaction routing 93 comprises various processes associated with the presentation of the interaction to agents, service persons, knowledge workers, business partners, customers and the like, that is, all transaction partners. Category 93 covers queuing, skill-based routing, automated treatment, workflow models, and so on.

Internal media layer 87 comprises an agent desktop interface not shown in FIG. 1, but described in more detail below. Both external layer 83 and internal layer 87 contain the required tools for enabling media and application-independent interfacing such as previously mentioned self-help wizards, media viewers, and other controls as prescribed via enterprise rules.

Internal media layer 87 provides an agent with, among other options, information about the customer or contact, information about current or historical business processes, information about current interactions and their relationship to business processes, and a knowledge-base to guide the agent or knowledge worker with interaction response and workflow. An agent a, and agent b, and a knowledge worker c are shown herein interacting with the system as illustrated via bi-directional arrows. The skilled artisan will recognize these are merely examples, and there may be many more such persons, and interactions in some instances may be routed to machines for response.

It will be apparent to one with skill in the art that the multi-tiered architecture of CINOS such as is illustrated herein may comprise many more or differing steps or processes without departing from the spirit and scope of the present invention.

FIG. 3 is a flow chart illustrating basic steps performed by the interaction operating system of FIG. 2 related to completing a transaction between a customer and an agent, wherein the transaction is initiated by the customer. Similar steps may be accomplished in the opposite direction for communications initiated by an agent, as the system is bi-directional, but the present example will serve to teach the inventive aspects of the system. In step 95, an incoming transaction, such as a live call, an e-mail, etc., is received at the appropriate CTI switch (COST) or routing server (DNT) in a CINOS communication center such as center 17. In step 97, customer and media type are identified and interaction proceeds.

All transactions, whether live calls, such as video calls, DNT calls and COST calls, or text-based documents, such as e-mails, are recorded and stored in one or more mass storage devices handled by one or more database applications. This may be taken as server 79 of FIG. 1, although the diagram of FIG. 1 is exemplary.

A principle object of the invention is to extract maximum information from every transaction for building a knowledge base that can be used for dynamic management and future analysis and development. This is done primarily by data mining, which is applicable to machine-operable code, that is text. Because of the nature of the extraction, there is a difference in the way live calls and text-based media is handled.

Discrimination as to the text nature of the media is made at step 99. If the media chosen by the customer is already text-based, then the transaction is recorded as received (101), and a data mining application extracts important information in step 103 and stores it in the knowledge base.

The distinct portions and versions of the transaction, such as the originally recorded version and any extracted data are related to one another and to other knowledge previously stored, and become part of a threaded interaction history associated with an ongoing interaction and ultimately of an overall contact history.

If the media chosen by the customer is determined in step **99** to be a live interaction such as a COST or IPNT call, then the existing knowledge base is accessed at step **107**, and the call is routed to the best fit agent. This may, of course, be done in a number of ways, such as an ADC, skill-based routing as known to the inventors, transfer to an IVR for automatic processing, and so on, as may be dictated by enterprise rules. If routing is to an agent, customer information may be retrieved from CIS server **57** (FIG. 1) and sent to the agent's PC, and appropriate scripts may be provided to guide an agent in interacting with the caller.

In step **109** the actual transaction is recorded as it takes place, which, in the case of live calls, may be a video or an audio recording or a combination of both. Preferably the recording is digitized.

In step **111**, a maximal text version is prepared from the actual transaction. The ability to do so depends to a degree on the sophistication of the system. This process may be as simple as a person adding notes for annotation or as sophisticated as a voice-to-text application preparing a full text version as the transaction transpires.

In step **113** the text version is mined for data and resulting knowledge is stored in the appropriate knowledge base for future use, and added to overall record with appropriate cross-referencing.

It will be apparent to one with skill in the art that there will be many routines comprising various steps for performing different processes as may be determined by enterprise rules which may likewise vary depending on, among other considerations, company type, product and or service type, communication center architecture, whether or not the system architecture is centralized or distributed, and so on. The embodiment taught herein is meant only as a basic example of process functionality related to CINOS processing of an incoming event.

FIG. **4** is a block diagram illustrating agent-desktop function according to an embodiment of the present invention. An agent-desktop client **115**, part of the CINOS overall architecture, enables an agent or knowledge worker to configure and control his or her interface to the rest of the system and to external media. Client **115** may be personalized according to a particular agents parameters. A desktop interface **117** may appear and function much like a personalized web-browser containing many similar attributes related to network capabilities including full multimedia function, software tool kits, linking and embedding capability, and so on.

An HTML client application **119** oversees all of the network capability previously mentioned. In this embodiment for example, HTML client **119** communicates with an Internet information server **121** using HTTP protocol which is standard. Client **119**, if provided minimally, may be used in conjunction with an Internet browser for full multimedia function. In some embodiments, it may be maximally provided to be a fully featured client with full web browser function. For example, an agent may create and edit web forms, web pages, embed controls into such web-based forms or pages to provide certain customer interaction mechanisms in addition to having a fully functional navigation tool at his disposal.

In another embodiment, Server **121** may be a server on a private network or corporate WAN instead of an Internet server. In a preferred embodiment, however, any number of servers on the Internet and/or linked to a WAN other than the Internet may communicate with client **119** as it intended to support all existing and known communication protocols.

A windows client **123** is provided to seamlessly integrate existing applications on the agent's PC to network applications and processes. This may be implemented via a desktop tool-kit **125** that contains all of the required controls for building, integrating and customizing the interface.

A business-logic layer comprises business object models **129**, hereinafter termed business objects **129**, representing contacts, interactions, knowledge-bases, events, routing processes, and other system routines. Integration and interaction of the various described desktop components with these logics is accomplished via common object modeling (COM) which is known in the art and available to the inventor. Desktop to CTI integration is accomplished via controls provided or created with a CTI set of tools or tool kit (not shown). For example, if the enterprise desires to blend voice and e-mail, the CTI tool kit would be used to build and integrate the interface.

Existing network applications such as CIS, enterprise resource planning (ERP), Commerce, and the like interact with various business objects using COM and may also interact with a physical database using ODBC and SQL.

Customer Interface Media Window

According to a preferred embodiment of the present invention, CINOS access by customers of an enhanced multimedia communication center, such as center **17** of FIG. **1**, is controlled by means of a customer-facing media interface, by which customers may be identified and even categorized according to numerous criteria. In some cases access may be controlled through subscription, or according to other qualifying criteria such as may be deemed appropriate by the enterprise. For example, if the enterprise is an exclusive investment club, membership may be required. Categorizing criteria may include demographic information such as income level, credit history, or any other attribute that may be quantified and used to categorize a customer.

An enterprise-controlled access point may be defined as an interfacing window or portal created and maintained at a typical customer entry point in a network as may be known in the art. Such interfaces may take the form of a WEB-based customer interface (a WEB page), an interactive voice response (IVR) unit, a service control point (SCP), or some other customer-facing system or apparatus as may be known in the art.

For the purposes of this specification, an example of an enterprise-controlled WEB-form access and interface window is illustrated as an example for a preferred embodiment. The inventor deems such an interface to be most adept in offering best-fit media options while remaining accessible to a large customer or client base.

FIG. **5** is a block diagram of a WEB-form customer interface according to an embodiment of the present invention. WEB form **133**, hereinafter termed access window **133**, is provided to be a part of an enterprise's WEB page which may be accessed through Internet connection and navigation, as is known in the art. Widow **133** is part of the CINOS software architecture described above, and represents the initiation of any customer interaction with the hosting enterprise. A WEB counter **143** is provided and records the number of visits to window **133**.

Window 133 is built and edited using COM codes available to the inventor and typically found in tool kits adapted for the purpose of creating interactive displays on a WEB page. Such a tool kit may be located on an agent's desktop, perhaps part of an agent's HTML client such as client 119 of FIG. 4. In one embodiment, it may be part of a system administrator's tool kit.

Window 133 contains interactive options directed at various categories and functions. For example, a new client section 135 contains interactive options related to adding a new client to the active customer base of the enterprise. A customer service section 137 contains interactive options presented to existing clients needing service. A new order section 139 contains interactive options presented to existing clients wishing to do new business.

Each offered interactive option is an embedded executable function having the appropriate links to other system areas of CINOS such as may be relevant to the immediate interaction such as to services offered, routing routines, database searching, interaction recording, and so on.

An innovative function of window 133 is to provide front-end control of access to the enterprise by existing and potential clients/customers. For example, as a client, contact, or potential client interacts with the various media and functional options presented by the enterprise in window 133, he or she is being directed according to enterprise rules in such a way that he or she may first be qualified or not to patronize the enterprise. Secondly, the contacting person may be categorized and sorted as to type of qualified customer. Thirdly, the person contacting person may be directed to pre-selected media options by the enterprise for various services offered including but not limited to routing live interactions, and so on.

In a preferred embodiment of the present invention, access window 133 is fully customizable, based on customer data and enterprise rules with the focus of such customization directed toward benefiting the enterprise and ultimately the client. That is, the client's options within window 133 are pre-selected and preferred by the hosting enterprise based in part on data about the client, details about the client's communication equipment and software, and enterprise rules and constraints. In some embodiments, the client may aid in customizing window 133. However, as it is desired by the enterprise to provide service in a cost-effective manner, the client will be presented with options as preferred by the enterprise in most cases.

To further illustrate, refer now to new client section 135. If window 133 is part of the enterprise WEB page, as is the case with this example, there will be a variety of visitors which may or may not be pre-qualified by the enterprise. Therefore, an interested party would begin (and be restricted to) taking a new client survey, illustrated as one of the options in section 135. If the enterprise rules require this as a first step, then the other options may be enabled only upon completion of the survey. By choosing new client survey, a second window may contain various survey options such as via e-mail, interactive voice recording, type and send method, or the like.

Information taken in the client survey is recorded and entered into a CINOS database such as DB 75 of FIG. 1. Such information may also be compared against enterprise rules or constraints, and other known information as may be available to the enterprise. Assuming the client is now recognized by the enterprise, the client's media hardware and telephony information may be recorded for future interaction purposes. Such information may include the client's personal computer parameters including modem type, Internet connection type, computer platform type, type of Internet phone application installed, etc. Similarly, COST telephone parameters may be recorded, such as personal phone number, business phone number, cellular phone number, forwarding numbers, and so on. Such data will influence latter customization of his personal window 133 for the particular client including the types of media that will be offered.

Finally, the client may be asked to create a password for the purpose of accessing CINOS. A section 141 is provided containing a network log-in option along with download sections for obtaining permanent and or temporary software as may be desired or needed, or, in some cases, required for the client to access certain services, view certain content, and so on.

Section 137 presents media options for clients seeking customer service from the enterprise. These options are, in a preferred embodiment, presented in a customized or personalized fashion within the client's window 133 as was described above. Therefore, each client patronizing the enterprise may access a version of window 133 that differs in look and functionality than that of another client. In this example, service section 137 contains options for e-mail, chat program, fax program, a self-help wizard, and a voice wizard. Other media types may be added or subtracted from the client's window 133 depending on any of several criteria. Personalization of widow 133 takes into account client information as stored in CINOS database 75, service-agent media availability and preferences, and perhaps any overriding enterprise rules. Unless and until a client is identified there are typically no options presented to the client for continuing a transaction with the enterprise.

For an identified client, by selecting the e-mail option, the client's preferred e-mail program may be activated for the purpose of sending a message to or soliciting a reply from a service agent. By selecting chat program, the client may be launched into a scheduled service seminar featuring many clients interacting with a service expert regarding a certain subject. One enterprise rule regarding section 137 may be that there is no telephone or I-phone media option for customer service for a client in the absence of an ongoing project with the particular customer. In this sense an ongoing project includes any unfinished business that the client is involved in with the enterprise.

Self-help wizards and voice wizards as illustrated in section 137 may be offered to help a client resolve an issue without taxing further resource. Such wizards may be customized based on a client's recorded data, perhaps confirming past interactions, providing account or order status, and so on. In some embodiments, selecting an option might avail several additional options. For example, selecting chat program may avail three possible chat programs to choose from with different schedules, content, and functionality attributed to each individual program.

New order section 139 in this example contains various options adapted to facilitate placing orders. The options as illustrated herein include, but are not limited to, I-phone, call back, promotional models, video presentations, an on-line viewer, and an order wizard. Interaction is the same as was stated with regards to section 137. For example, selecting promotional models, accesses a database containing the current promotional information and features of products which may be viewed interactively by the client using an on-line viewer offered as one of the functional options (tool). The options presented in the New Orders section may also

be customized according to client identity, demographics, transaction history, and enterprise rules.

On-line viewers may enable the client to view documents that are not supported on his computer platform. Selecting video presentation may avail several types of videos for viewing, such that the client may choose one. If the client does not have a viewer installed on his computer which will support the offered video, perhaps the on-line viewer may play the video, or the client could download a temporary viewer from section **141**, etc. Selecting call back may bring up a second array of media choices made available by the enterprise for receiving a reply interaction from an agent.

By providing a controlled interface window such as window **133** the enterprise may control routing and interaction right from the beginning of customer contact. Through the innovative method of linking and reporting to other CINOS functions, and repositories, much real-time personaliation of window **133** according to enterprise rules and customer parameters may be made automatically. For example, if a client's history indicates a propensity toward frequent buying, an I-phone option may be presented in customer service section **137** in his window **133** immediately after such a determination so that he may get direct customer service at all times.

Certain media options, as described above, may be afforded a certain priority over one another regarding interaction with the enterprise. For example, a VIP client may have live interactive media choices offered in window **133** such as I-phone, call back to COST phone, video phone, etc. A client known for infrequent contact or troublesome interactive history may be limited to text-based interaction such as e-mail and so on.

As an integral part of CINOS functionality, window **133** acts as a portal through which existing and potential clients may be screened, categorized and routed according to enterprise rules. Customer interfaces such as window **133** may be provided at various locations on a WAN such as the Internet without departing from the spirit and scope of the present invention. Such portals may exist in different geographic regions, and may be created for differing customer bases such as one for Latin America, and one for the pacific rim, and so on. Instances of CINOS routine may be distributed widely over a network.

Although the example provided herein is of a WEB form, it will be apparent to one with skill in the art that a CTI counterpart may be created for the COST telephony network. Such a case may be a CINOS enhanced IVR at an SCP or customer access point in the COST network.

CINOS, as previously described, optimizes customer/agent interaction in a manner which is economical and cost efficient to both the enterprise and the patronizing client. The customer interfacing window as taught herein with regards to FIG. **5** is innovative in that it is a fully customizable portal that facilities seamless integration between clients and enterprise agents according to enterprise rules. Further innovation is evident in that client data is fully and seamlessly integrated with CINOS intelligence and enterprise rules regarding routing of interactions and other constraints or limitations that are programmed into the system. In effect, logic from the front end, or customer side, to the back end or agent side is linked and accessible to all appropriate CINOS routines which include applicable CTI CINOS routines. The various customer interfacing logic is are explained more fully below in a series of process logic steps in a flow chart.

FIG. **6** is a flow chart illustrating media-presentation and customer-interface logic steps according to an embodiment of the present invention. In step **145**, a visitor registers at an enterprise's WEB page. The visitor is identified according to enterprise rules in step **147**. In step **148** CINOS determines the current status of the visitor after searching known client and contact data records. For example, the visitor may be a potential new client, an existing client, or an existing business contact. Although not specifically illustrated, a potential or new-business-client is not typically logically separated from a potential new-client until further process ensues in step **149** with regards to qualification via survey.

If the visitor wishes to be a client, he may log-in to the network system in step **159**. Log-in may be automatic in the event that CINOS remembers the client's assigned password, or perhaps typing the password or other code may still be required for security reasons. At the time of log-in, window **133** is presented in personalized fashion according to client data and enterprise rules in step **161**. In step **163**, interaction between an enterprise entity and the client begins with a media type that is offered by the enterprise and selected by the client. An enterprise entity, as immediately described above, is herein defined as an agent, knowledge worker, service person, or any other live attendant, as well as any entity constituting an automated response action such as an automated fax, an IVR, automated file downloads, etc.

At step **148**, if it is determined that the visitor is new, then a new client survey is conducted in step **149**. Step **149** will determine if the new visitor is a client or business contact via the survey process. As described with reference to FIG. **6**, the client survey may be conducted using a variety of known techniques and media. Presuming that a new visitor qualifies as a client or business contact in step **149**, he or she may be asked to create a password in order to provide access to CINOS. In step **153**, the client's appropriate communication and system parameters are recorded for future reference and for use in customizing window **133**.

At step **155**, a client instance of CINOS, or perhaps another enabling application, may be presented for download by the client. In some embodiments, there may be no required software for download. Therefore, step **155** may be considered optional in this regard. In step **157**, the new client may log-in to the network system and begin interaction. Because the client, in this case, is accessing the system for the first time, the steps wherein he would obtain a customized window and begin interaction with an enterprise entity are not shown as intermediate configuration of media choices, product preferences, and the like, may still be required before a customized interface may be presented. In one embodiment, the client may not see a customized window until the next time he or she attempts to access the network.

Steps **165**, **167**, and **169** for an existing business contact as determined in step **148** are similar to steps **159**, **161**, and **163** for an existing client although the rules for interaction such as media used, personnel involved and so forth will be different. For example, in step **167** an existing business contact may be offered the option of using a network-collaboration program wherein I-phone, file sharing, video conferencing and the like are inherent to that one application.

It will be appreciated that there are many possible logic sequences or steps that may be followed in interfacing and enabling interaction between a client and an enterprise entity without departing from the spirit and scope of the present invention. FIG. **6** presents just one possible example of many.

It will be apparent to one with skill in the art that the rules governing the types of media offered to clients may be based

on a combination of variables such as may be decided upon by the enterprise without departing from the spirit and scope of the present invention. Likewise, offered media types may be added or withheld from a client over a period of time based on such variables. Moreover, such additions or subtractions of media availability with regards to customer interface window **133** may be automated and based on calculated variables.

In one embodiment, a client may add or subtract media choices if desired, however, the enterprise may reserve the right not to engage such media if added by a client.

In one embodiment, special application-independent media viewers such as the viewer offered in section **139** of window **133** of FIG. **5**, are offered to clients and possessed by agents so that initial illegible information may be made human readable regardless of the authoring application used by the agent or the client in the process of interaction.

Rules-Based Storage and Threading of Multimedia Interactions

In a preferred embodiment of the present invention, all CINOS controlled interactions with customers or business contacts are recorded and stored in a contact history comprising a MIS database and a text database such as were described with reference to copending application P3313PA, and described above. That is, actual multimedia interactions are recorded to one database or to a section of one database supporting all multimedia types used in the communication center, and text-based versions are stored in another database or portion of the same database. All of the actual recorded transactions and text versions are related as a threaded contact history which may be separate from or part of the same database as will be further explained below.

FIG. **7** is an exemplary overview of a multimedia-interaction storage system within a communication center according to an embodiment of the present invention. A system architecture **171** is illustrated solely for the purpose of providing just one of many possible architectures in which the methods and apparatus of the invention may be practiced. Architecture **171**, which in a preferred embodiment comprises both conventional and DNT apparatus, is exemplary of an architecture that could facilitate CINOS according to an embodiment of the present invention such as is also the case of FIG. **1**

At the heart of the storage system is a mass-storage repository **187** adapted to store multimedia interactions as well as text-based related files. Repository **187** may utilize any form of digital storage technology known in the art such as Raid-Array, Optical Storage, and so on. The storage capacity of repository **187** will depend directly on it's implementation with regard to the size of the communication center and predicted amount of data that will be stored and kept by the system.

In this example, repository **187** is divided logically into two sections. One section, multimedia information system (MIS) **189**, is responsible for housing all multimedia interactions defined as media that is not text-based such as audio, video, and graphics-based media. All multimedia interactions are stored in MIS **189** whether incoming, outgoing, or internal. A second section, herein referred to as text section **191** is responsible for all text-based interactions as well as text versions related to non-text files. Sections **191** and **189** of repository **187** are analogous to MIS **79** and DB **75** of FIG. **3**.

Repository **187** is connected to a communication-center local area network (LAN) **195**. Repository **187** is accessible via LAN **195** to authorized personnel within a communication center such as agents, knowledge workers, or the like, and may, in some instances, also be made available to clients communicating with the call center. A network router (RTN) **175** is shown connected to LAN **195** via network connection **203**. In this example, network router **175** is the first point within a communication center wherein DNT media arrives. Network router **175** is exemplary of many types of routers that may be used to route data over LAN **195**. An Internet-protocol-network-telephony (IPNT) switch **176** is connected to network router **175** via data link as is known in the art. IPNT switch **176** further routes or distributes live IPNT calls that do not require routing to a live agent. IPNT calls that are routed to live agents are sent over connection **203** to LAN **195** where they reach agent PC/VDU's (not shown) or DNT-capable phones (not shown) as illustrated via directional arrows.

An object of the present invention is to record all multimedia interactions and store them in MIS **189**. A further object of the present invention is to similarly record text versions of and text files related to all multimedia interactions and to store them in text-based section **191**. For the purpose of the present invention, a text version of a non-text file is defined as a sufficient text rendition or description of a corresponding multimedia interaction. Still another object of the present invention is to provide an innovative mechanism wherein authorized persons may access any particular block of text and if desired, call up the actual media to which the text relates.

More detail regarding the order and manipulation of repository **187** is described further below.

Creating text-based versions of live multimedia interactions may, in some cases, be accomplished via an automated method. For example, a digital voice attendant **197** is provided and linked to IPNT switch **176**. Digital voice attendant **197** may be of the form of a DNT-capable IVR or other digital voice-response mechanism as may be known in the art. Such automated attendants may interact with a voice caller instead of requiring a live agent. A speech to text converter **199** is provided and linked to voice attendant **197**. As digital voice attendant **197** interacts with a caller, speech to text converter **199** uses voice recognition technology to convert the audio speech to text. Such text may then be stored automatically into text section **191** and related to the also-recorded audio data.

It will be apparent to one with skill in the art that as speech recognition technologies are further improved over their current state, which is adequate for many implementations, reliable text versions of audio transactions are not only possible but practical. Such speech to text conversions are used here only for the convenience of automation wherein no live attendant is needed to transcribe such audio data. The inventor is familiar with such converters as used in the CINOS system according to a preferred embodiment. Such converters provide convenience in the practice of the present invention but are not specifically required to achieve the objects of the present invention.

Manual transcription may also be used to convert audio/video to text or code that may then be entered into text section **191**. For example, a live attendant **201** is shown connected to LAN **195**. Attendant **201**, in this case, may be given the responsibility of transcribing audio files from speech to text and annotating video or graphics files for the purpose of creating text files related to the non-text data. One or more live attendants such as attendant **201** may be provided for this purpose. Some media arriving at a com-

munication center such as the one represented via architecture **171** will already be text-based and therefore require no conversion or annotation. Short e-mails, Faxes, word documents, and so on are part of this media category.

An automated services system **193** is illustrated as having a direct connection to section **191** of the data repository. System **193** is provided for certain text-based interactions, as described above, wherein a complete text record of the interaction may be mirrored, or otherwise created and stored into text section **191**. Such automated services may include but are not limited to automated e-mail and fax systems. For example, a fax may be sent and mirrored into section **191** or, perhaps recreated using an optical character recognition (OCR) technique and then entered. Physical text-documents such as legal papers and the like, may be automatically scanned into text section **191** before they are sent to clients. There are many possible automated techniques for entering text files into a database. Such methods described with regards to automated services **193** are a convenience in practicing the present invention but are not specifically required to achieve the objects of the present invention.

With respect to the dual capability (COST/DNT) of architecture **171**, a central telephony switch **173** is provided to be a first destination for COST calls arriving from, for example, a PSTN network. Switch **173** may be a PBX, ACD, or another known type of telephony switch. Internal COST wiring **182** connects telephony switch **173** to agent's individual telephones (not shown). Switch **173** is enhanced via a processor **179** running an instance of T-server and an instance of Stat-server, which are software enhancements known to the inventor and have been previously described. Such enhancements provide CTI applications, such as intelligent routing, but are not specifically required to practice the present invention. CINOS as previously described is adapted to be integrated with such software when present in a CINOS enhanced communication-center.

An intelligent peripheral in the form of a COST IVR **177** is provided for the purpose of interacting with callers seeking information and the like who do not require connection to a live agent. IVR technology may comprise voice response, touch tone interaction, or a combination of these technologies. IVR **177** is linked to processor **179** and also to automated services **193**. An example of an IVR interaction may be the presentation to a caller of options for using an automated service such as those described above, or perhaps waiting for a live agent.

A CTI to DNT interface **181** is provided for the purpose of converting COST interactions to digital mode compatible with DNT so as to be adapted for digital storage and interaction according to CINOS functionality and enterprise business rules as described above. Interface **181** is not specifically required to practice the present invention so long as appropriate application programming interfaces (API's) are provided for equipment that interfaces with CINOS. Bi-directional arrows illustrated between interface **181** and IVR **177** represent the ability to route interactions in either direction. COST to DNT conversion may be accomplished in IVR **177** in addition to or in place of interface **181**. The connection architecture presented herein is exemplary only.

A speech to text converter **185** is provided for converting audio from the CTI side to text for entering into text section **191** as was taught with regards to converter **199** on the DNT side. Actual recorded media interactions are illustrated entering MIS **189** after text versions are rendered and entered into section **191**, however, this is not required. In some instances text versions of multimedia interactions may be rendered after the interaction is stored. There is no limitation regarding sequence. It is sufficient to say that converters **185** and **199** are capable of real-time conversion and entry.

Server **183** shown connected to LAN **195** is adapted to host a CINOS MGR.(operating system) application which provides control and organization with regard to various functions provided by the CINOS system as a whole. The storage architecture represented herein by element **171**, and all it encompasses in this embodiment, is meant only to be an example architecture as may be dedicated to the storage and organization of communication-center data according to enterprise rules.

A unique method termed multimedia threading by the inventor is used in a preferred embodiment of the present invention for relating each multimedia interaction whether incoming to, out going from, or internal to the system, such as between an agent and a supervisor. This innovative process allows agents or other authorized personnel to access text data and ability cross-reference the data to actual recorded multimedia interactions which may be displayed and played back.

FIG. **8** is an illustration of a relational diagram as might be displayed on a display monitor, representing entities stored in the databases described. The blocks of FIG. **8** illustrate threaded text-blocks and their relationship to stored multimedia according to an embodiment of the present invention. Repository **187** comprises section **191** and **189** as illustrated in FIG. **7**. Section **191** contains text versions of interactions that are related by such as chronology, issue, participants, company affiliation, and the like. The text documents and versions of non-text files, represented in this case by icons, are shown related by serial position. For the sake of clarity regarding the innovative threading according to an embodiment of the present invention, a brief description of prior art threading follows.

Threaded dialog as is known in prior art involves a system of strings or threads that are identified as being inherent to a single entity or subject matter wherein the dialog (questions and replies) is about that subject or about a question or subject that an entity has brought forth. A threaded dialog may be finite dialog (is closed at some point) or it may be ongoing. Typically, a thread, which connects or associates the pieces of dialog, contains all of the dialog in the order that it happened such as in chronological order. Threading may be implemented based on other criteria as may be appropriate for a particular situation or by particular rules.

As previously described with reference to the background section, prior art threading techniques are confined to text such as with an on-line message board or the like. The inventor knows of no system that supports full multimedia interaction. The innovative implementation taught below integrates the text-based thread with stored multimedia interactions such that one may interact with the thread and access various stored media associated with the thread.

Referring again to FIG. **8**, a customer **205** is illustrated as having two threads. They are issue I and issue II. Customer **205** has an assigned number XX-XX that identifies him or her with respect to the CINOS system. Issues I and II may comprise sales dialog, purchasing dialog, or any other type or purposed dialog as may be generic to the hosting enterprise. Customer **205** may well be a business contact, or even an internal agent practicing dialog with a supervisor or the like.

A series of icons a–d represent the type of media stored for each text block (text not shown). For example, issue I

comprises first an e-mail text followed by a fax text, WEB text, and V-phone text. In this case, a time stamp or other known method may be used to insure that each text block is in order. Icons a–d are interactive pointers or links to the actual media interactions that they represent. That is, the first block of e-mail text is associated with an interactive icon, in this case icon a. By clicking on icon a with a pointer device, the actual e-mail may be accessed and viewed. In an alternative aspect, not only the actual transaction may be presented to a user for review, but related files may also be listed or otherwise presented for selection and review.

A logical link **207** represents cross-referencing capability between sections **191** and **189**. Dialog may be threaded according to a wide variety of business rules. For example, a thread or string may represent dialog about a customer, product, agent, group of agents, group of customers, and so on. An identifier is assigned to an entity and to all the communication events to or from that entity, or those in which the entity may have been involved such as a group discussion or chat. In this way all interactions may be organized and stored accordingly.

In one embodiment, keyboard commands could be used to cross-reference to actual media instead of icons. In another embodiment, text versions of actual media are fully viewable with the text itself appearing in interactive form whereupon a double click may call up the associated media and so on. There are many variations within the scope of the invention.

Although actual recorded media interactions are, in this embodiment, stored in MIS **189**, there does not have to be two separate databases (one for text and one for actual media). All data may reside in one database and be sectioned in storage. For example, one click on the customer name may bring up text only, while a double click on the text brings up the associated media.

In MIS **189**, recorded multimedia interactions are represented by icons I–IV and VI. For example element I represents all recorded Video phone interactions. Element II represents all e-mails. Element III represents all recorded COST interactions. Similar associations are made with respect to elements IV and VI which represent WEB interactions and Video mails respectively. WEB interactions IV may include on-line orders, requests, information forms, signed certificates, and so on.

Element V represents additional stored multimedia files dedicated to, for example, promoting the enterprises products or services. Promotional files V may contain files of the form of any enterprise supported multimedia. These files may be tools that can be sent to clients upon request or perhaps periodically.

Referring again to section **191**, element b located on the thread labeled issue I represents text from a fax. Because a fax is text-based and not a multimedia interaction, there is no corresponding media event associated with it. However, the fax is threaded into the dialog according to, in this case, chronological order. A short example of a proposed dialog concerning issue I follows.

Element a represents an e-mail sent by customer **205** to the enterprise requesting pricing information. An enterprise agent responds with a fax (b) to customer **205** containing the requested information. Customer **205** then places an on-line order (element c) along with a request for confirmation via video phone (element d). Issue I may be closed at this point. Issue II may represent a threaded dialog concerning company service with regards to the customer order of issue I, or perhaps an agent-to-manufacturer dialog regarding how the order was handled with respect to issue I.

In accordance with CINOS functionality as previously taught in descriptions above, data may be mined from repository **187** for the purpose of enhancing service to customer **205**. Mined data may be used to affect routing of interactions, product promotions or advertisements that may be sent to customer **205**. In some cases, mined data may effect new dialog with a customer or business contact resulting in new thread additions. A complete contact history with interactive linking to actual recorded media enables the enterprise to resolve disputes more easily, better service the customer, and enhance profitability for the enterprise.

FIG. **9** is a process flow chart illustrating logical steps taken when building a threaded multimedia contact-history of communication-center interactions according to an embodiment of the present invention. Logical process steps as illustrated herein are meant to represent just one of many sequences which may be implemented when building a multimedia-threaded contact-history. Actual steps will depend on enterprise rules. In step **209**, a current interaction to be recorded is identified. Identifiers may include special passwords or codes for identifying the contacts involved with the interaction. The media type of the interaction is identified in step **211**. If the media type is already text-based, as confirmed in step **213**, then the interaction is prepared for entry into a database such as section **191** of FIG. **8**. Preparation may include such automated processes as scanning, mirroring, file conversions, and so on. Manual annotation via live attendants such as attendant **201** of FIG. **7** may also be performed. In step **223**, the text interaction is entered into section **191** of repository **187** and takes it's place along the associated dialog thread according to enterprise rules.

If the interaction is of the form of non-text media as identified in step **211**, then the MIS section of repository **187**, or section **189**, is notified to accept the input. At step **219**, the non-text interaction is recorded into section **189** of repository **187**. This may occur in real time as the interaction takes place, or some point after the media interaction was recorded.

In step **221**, a text version of the recorded media or a text-based document related to the transaction is rendered for storage into section **191** as part of the thread. In some instances, as described with reference to FIG. **7**, step **221** is automated via speech to text converters and occurs at the same time or before the recorded multimedia interaction is entered into section **189**. In other instances, text versions of multimedia interactions may be rendered after the recorded interaction is stored. A live attendant such as attendant **201** of FIG. **7** may be assigned to parse video and or audio for applicable text. Such parsed text is entered into section **191** and takes it's place along the thread as was described above.

In all cases, an identifying medium is used to assign portions of an ongoing dialog to the proper location along a thread as well as provide identification to actual recorded media for cross-referencing such as may occur during a system audit or contact review. Further, the appropriate icons and or links are created and associated to entered text wherein actual multimedia may be cross-referenced in interactive fashion. Hence, the type of media may be readily identified by an auditing or reviewing agent simply by browsing the threaded text with accessibility to the recorded events made by interactive method such as clicking an icon with a pointer device as was previously described. As an additional benefit all of the threaded dialog, whether text based or not, is rendered in a form that data mining may be used to create many useful relationships and to derive much useful information from the stored data.

It will be apparent to one with skill in the art that the order and specific function of logical steps as taught herein may

vary according to the type of enterprise, existing enterprise rules, and so on. For example, instead of threaded dialogs being inherent to a specific customer with the dialog being about the customers interactions, it may be specific to a particular agent with the dialog about the agents activities. Such differences in thread assignment may be incorporated into one rules-based repository.

Interactive Multimedia Viewers and Applications

In a preferred embodiment of the present invention, CINOS users comprising such as customers, agents, and business associates are provided with innovative multimedia applications that are containers for dedicated multimedia viewers enabling a particular user to perform a dedicated function or functions including gaining access to and viewing media from selected areas of CINOS data storage. Provision of such applications allows any objective to be gained regarding virtually any aspect of the enterprise. These interactive applications are built from a parent application or container that may contain all of the interactive modules that may be desired to effect a specific application to be presented to a user having a need for such an application.

According to various embodiments of the present invention, which are described below, the multimedia applications may be adapted for such tasks as placing orders, previewing products, determining customer profitability, calculating sales volumes, reviewing agent performances, or any other enterprise-conceived objective. The abilities and constraints applied to these unique applications are limited only by the imagination, and tools available to an authorized programmer or worker, such as a knowledge worker, who creates the applications.

FIG. **10** is a block diagram illustrating an interactive multimedia application (IMA) tool kit and a diagram of a created IMA application according to an embodiment of the present invention. An IMA tool kit **225** is provided to an authorized programmer, which may be a knowledge worker, for the purpose of creating special multimedia applications such as an IMA **239** (illustrated within tool kit) for users of CINOS, wherein users may access and interact with certain pre-selected data for the purpose of reaching decisions and performing certain dedicated objectives as may be defined by enterprise rules. IMA tool kit **225** contains executable codes or modules represented as building blocks by the inventors. These modules may be used by themselves for certain functions, or may be linked to each other to provide additional function in a programmed order. A good example of such a module would be a combination of COM codes used to build an interactive graphical interface (module), and the like.

Among these functional modules are interactive media viewers (IMV's) **227** which are provided and adapted for viewing certain media supported by the enterprise hosting a communication center employing CINOS. Supported media types may include but are not limited to telephony (traditional or IP), interactive voice response (IVR), e-mails, WEB embedded interfaces or forms, faxes, chat programs, multiparty threaded discussions, etc. IMV's **227** are unique in the fact that they are dedicated viewers including an interactive layer that enables viewing of only pre-selected media as defined by enterprise rules. For example, CINOS users may be assigned an identification code or number which will also be tagged to all of their stored interactions as described elsewhere above with reference to FIG. **9**. These codes may be used to associate individuals with limitations and constraints from viewing media that is not part of their own contact history (for example). Other limitations or constraints may also be applied to IMV's **227** as may be conceived and implemented by a programmer such as playing or viewing interactions of certain dates, playing or viewing interactions about certain subjects, and so on. An editable software layer inherent to each viewer enables a programmer to build such constraints into a particular viewer, and to add the edited viewer to an IMA Application Program Interfaces (API's) **229** are provided to allow a user to send obtained data or calculated results to connected peripheral devices or software modules or applications as may be required for operations such as printing, faxing, sending over a network, etc. If it is desired by enterprise rules, for example that a customer be able to print certain text or graphic information obtained through IMA **239**, then the appropriate interface may be provided.

Database Access Modules (DAM's) **231** are provided for allowing access to normally restricted databases that may be connected to CINOS architecture. Such databases will of course include multimedia information systems (MIS), customer information systems (CIS), which may also include contact and agent associated data, external databases such as may be hosted by the enterprise, and so on. Constraints may be applied to DAM's **231** pertaining to which and or what portions of certain databases may be accessed by an application.

Programming language modules **233** are provided and adapted to facilitate the type of platform/system that an IMA such as IMA **239** will be created for. One IMA such as IMA **239** may be adapted to run on a variety of system types and platforms. System platform modules are provided as API's for intended supported system/platform combinations. Mathematical function modules (MFM's) are provided and adapted to interact with CINOS databases for the purpose of performing pre-selected calculations such as cost averaging and so on.

In this particular embodiment, IMA **239** is a finished application ready to be distributed. IMA **239** contains default display modules (not shown) for the purpose of enabling computer screen display on a user's system as is known in the art. IMA **239** may be stored in a special applications server (not shown) connected to the CINOS network either at WAN level or at the level of the hosting communication center. The method of distribution for IMA's such as IMA **239** may be of the form of a WEB-based client presentation to a user such as in customer window **135** of FIG. **5**, for example. IMA **239** may also be of the form of a browser plug-in accessible via a server such as may be the case with a special applications server as described above. In other instances, such applications may be made a part of an agent's desktop and so on. There are many and varied possibilities.

In this particular embodiment, which is exemplary only, IMA **239** is of the form of an interactive purchase guide for bulk paper products as illustrated via underlined title. IMA **239**, in this example, is logically separated into two distinct operations or functions. These are operation **241** and operation **243**. Operation **241** is a product preview interactive guide, while operation **243** is an order guide. The number of operations built in to an IMA such as IMA **239** will depend upon the intended purpose of the application according to enterprise rules.

For exemplary purposes, assume that IMA **239** which is, in this case, a purchase guide for bulk paper products, is to be presented to a corporate buyer who is new on the job.

Because he is new, he may be uncomfortable with his own knowledge of how much or what kind of paper to buy. His predecessor may have a long purchase history with the enterprise. Therefore, he requests an IMA such as IMA **239** that will allow him to preview products, browse the past purchase history of his predecessor, and perform a calculation that averages, by month, the last years paper purchases made by his company.

According to enterprise rules, IMA **239** adheres most closely to the buyer's request. That is, It allows for preview of products (**241**), and leads the buyer toward an order (**243**). IMA **239** may, in some instances, be designed specifically for one buyer if it is determined that his level of business contribution warrants it. However, in most cases, IMA applications such as application **239** will be more generic with interchange between different users accomplished with some editing performed based upon the intended use of the application and user parameters.

A communication center may provide a number of standard IMA's with each IMA adapted to a different objective. A communication center may also provide custom-built MIAs for any specific purpose. A certain amount of editing ability renders one IMA usable in more than one situation.

Referring now to IMA **239**, as previously described, operations **241** (product preview) and operation **243** (order guide) are available and related to purchasing bulk paper products. Operation **241** begins by presenting two different platform options from which a user may select. A platform A may be a Windows platform, and a platform B may be a UNIX platform. There may be more or fewer options regarding platforms. Similarly, applicable modules such as may be generic to a certain platform are installed with each platform. In this way, one application may be run on differing platforms.

An API, labeled as such, shown logically connected beneath platforms A and B is illustrative of an interface for linked modules depended on platform choice. A database module (DAM) is first logically connected to the API module previously described. The DAM controls which database or databases may be accessed by IMA **239**. A window shown immediately beneath the DAM provides an edit interface wherein the author or programmer may insert additional constraints, such as allowing access to only certain database sections and so on.

A mathematical function module (MFM) labeled as such is shown beneath, and logically connected to the edit window. MFM is adapted to allow prescribed mathematical operations to be performed relative to database information such as cost averaging, grouping by product preference, and so on. Various modules as have been described herein may bring up additional displays on a user's computer if the module in question offers a choice of operation or returns readable results. Furthermore, standard preview modules (not shown) may be presented as object models and invoke standard viewers such as may be installed on the user's computer system.

An interactive media viewer block (IMV) shown logically connected to MFM, allows the user to view pre-selected media interactions that are persistently stored in a database such as MIS **189** of FIG. **7**. The IMV block shown may represent a plurality of unique IMVs or a single IMV. In this case three IMVs are involved, and these are represented by the blocks labeled TXT (text), VID (video), and AU (audio). Each individual IMV has an edit layer wherein a programmer may apply limitations or constraints relative to viewing capability. In some cases the same limitations may be applied to all the IMVs of an application in one editing sequence, such as by doing one edit and copying that edit to other IMVs. Although there are three illustrated viewer modules that make up the IMV in this example, more or fewer viewer modules may be used depending upon the intended use of IMA **239** and enterprise rules.

Although not explicitly shown, each IMV is editable through a software layer. In this way, a user may be limited to viewing certain media interactions and transactions that are allowed via enterprise rules. For example, TXT viewer may only be able to view e-mails from the user and agent in a specific interaction thread, but not intermittent e-mails on the thread that may be from agent to agent or supervisor to agent and so on. Because each interactor with CINOS has an identification, and all interactions from or to them are so identified, these identifiers may be used in the edit layer of each viewer to constrain the user. In this way, a user may be granted access to a history database and view only his interactions without imposing on other users who share the system. Likewise, agents or supervisors charged with the task of reviewing the activities of certain other agents may use applications such as IMA **239**, adapted for the stated purpose, and be constrained in terms of whose interactions (agent's) may be viewed, and so on. In this manner full use may be provided to specialized users without exposing otherwise sensitive information that is not pertinent to the user or the purpose of the IMA.

Operation **243** created to allow a user to place an order for products is, in this case, a logical close for the previous operation. A module labeled Media Options may present standard media choices that the enterprise accepts for placing an order such as IP phone, e-mail, and so on. A connected text module (TXT) allows the user to send a quick text order while on-line. A send button sends a completed order to the enterprise.

It will be apparent to one with skill in the art that an IMA such as IMA **239** may be programmed for virtually any enterprise objective without departing from the spirit and scope of the present invention, such as those already described. By utilizing pre-built modules instead of writing codes line-by-line, programmers may greatly increase the efficiency of application preparation and presentation to users. In many cases only slight editing is required to present a new application to a particular user. By using COM, and other known conventions such as Java, applications are quickly assembled or modified as has been taught herein.

FIG. **11** is a process flowchart illustrating logical steps for building an IMA for a user interacting with CINOS according to an embodiment of the present invention. The process described below is meant to be just one example of many differing processes that may be implemented when building and customizing an IMA such as IMA **239** of FIG. **10**. The process components and order of which they are assembled will depend largely upon the type and purpose of the application being assembled and enterprise rules.

In step **238**, the programmer or application author opens his tool kit. Such a tool kit may be part of tool kit **125** of FIG. **4** on a CINOS desktop interface. In step **240**, the author sets system and platform parameters. That is, he inserts the proper functional modules for use of the application on specific platforms and or system types. For example, the author may set up one application to run on more than one platform or system such as IBM and Macintosh. It should be noted here that if more than one type of system is supported in one application, then the associated modules will need to be included as well.

In step **242**, the author selects a programming language module containing libraries of known programming languages and codes. As known in the art, there are different programming languages used for different platforms. The author, in addition to building with pre-assembled modules, or building blocks, may have to write certain functional code in the supported language. In a preferred embodiment, the author has access to these language libraries from within his tool kit.

In step **245**, database access module(s) (DAMs) are selected and inserted. As previously described with reference to FIG. **10**, these modules will determine which and what portions of databases may be accessed. In an alternative embodiment these restrictions may also be a part of the editable layer of IMVs. Step **247** covers mathematical functions relative to selected databases. Mathematical function modules (MFM's) allow a user to perform pre-defined operations. MFMs may or may not be needed in an IMA. This step may be omitted if no such functions are requested by a user or otherwise required in an application.

In step **249**, interactive media viewers (IMV's) are created using viewer modules adapted to view certain media of the type that stored interactions comprise. An IMV is a module that may comprise one or more than one media viewer. Each of these viewer modules are editable (via software layer) and may function alone or as a component of a larger module (comprising more than one viewer).

In step **251**, closing modules are inserted to complete the application. For example, order modules are one example of a closing modules. Modules adapted to return displayed results would be another example. Moreover, peripheral device API's may be inserted to allow results to be printed, faxed, sent over the network, etc. In this way, a supervisor reviewing the performance of a group of agents may report to other concerned parties such as managers, enterprise board members, or the like.

The example as illustrated herein is basic but is deemed adequate by the inventor for illustration of one typical IMA building sequence. The description and order of steps may vary considerably.

IMA's such as IMA **239** are transportable over a network and may be stored on a special applications server at network level, or within the communication center. In some embodiments, user's will be connected to the Internet when using IMA's allowing CINOS access. In other embodiments, agents may access CINOS resources while working off-line with respect to the Internet. In such cases, logging on to CINOS is still required.

It will be apparent to one with skill in the art that IMA **239** as taught herein is interactive and displayable on a PC/VDU that is logged into CINOS through a WAN. However, this is not specifically required to practice the present invention, but rather preferred. Other embodiments may include presenting a CTI interface such as an IVR wherein a user may interact with the application via voice or touch tone response.

In still another embodiment, such applications may be presented via external media such as on a floppy disk(s) or CD-ROM wherein a user may, by inserting the disk or CD, obtain the ability of accessing the enterprise via WAN, gaining access to CINOS, and performing an objective with the IMA.

Stored-Media Interface Engine (Interaction Object Model)

An object of the present invention is to allow certain CINOS systems to utilize data, such as data about customers, contacts, business associates, products and agents, to accomplish objectives and to effect improvements in overall system performance. Such data must be utilized very quickly in order to aid in influencing such system objectives as efficient routing to clients based on client data, or as another example, generating an updated sales-volume report based on an entire customer base's latest transactional history. Certain CINOS automated systems will have to be able to make decisions in a time frame that would not be sufficient to allow physical accessing of actual media. Therefore, an innovative interface between stored multimedia data and various CINOS intelligent systems is provided and taught below.

According to a preferred embodiment of the present invention, a stored-media interface engine is provided in the form of an interaction object model (IOM). This unique convention provides a system-accessible abstract of all stored interactions within a multimedia communication center.

FIG. **12** is a block diagram illustrating a relationship between a mass repository **263**, an interaction object model (IOM interface) **253**, and several data-interaction systems according to an embodiment of the present invention. Interaction object model (IOM) **253** functions as a memory-based interface-engine between mass repository **263** and a variety of CINOS data-interaction systems illustrated in this example as customer information system (CIS) **255**, audit system (AT SYS) **257**, routing system (RT SYS) **259**, and automated services system (AS SYS) **261**. It will be apparent to the skilled artisan that there may be many different interaction systems, and the ones illustrated here are exemplary.

Repository **263** is analogous to mass repository **187** of FIG. **7**. It is logically divided into two sections. One section is for threaded text labeled Text-Based Data, and one is for multimedia storage labeled MIS Database. All of the communication center's interactions and transactions in this example are persistently stored in repository **263**.

Automated CINOS systems such as systems **255** through **261** are adapted to interact with data stored in repository **263** in order to perform their intended functions related to CINOS operation. For example, CIS **255** uses data in repository **263** for presenting information to agent's at the time of or ahead of a live interaction. AT SYS **257** has to access and process data for generating system audits. RT SYS **259** requires data for intelligent routing purposes. AS SYS **261** uses data to update and configure services such as faxes, e-mails, voice messaging, and the like.

IOM **253** is adapted to function as an interface between repository **263** (hard data) and the data interaction systems as described above. IOM **253** is an object model comprising objects as representations of stored files in repository **263**, such as non-text files of recorded transactions. Each object making up the model is a representation of one such file. In a preferred embodiment, IOM is a COM-based model with which other CINOS COM-based applications may readily interact without language conversion interfaces. However, in other embodiments, API's may be provided where language differences are present.

IOM **253** has various capabilities in various embodiments which may include, among other functions, a search function **265** adapted to accept parameters as a guide to obtain requested information from IOM memory (element **275**). There is in this embodiment a data-mining function **267** adapted for mining hard data and converting mined data into suitable code for applying to memory objects (represented

interactions). A display function **269** is adapted to enable data results to be displayed on suitable screen monitors which may be associated with various data interaction systems as previously described. An API function **271** provides appropriate interface for linking interaction-data systems such as systems **255–261** to IOM **253**. An edit function provides editing ability to object parameters by system applications which may, in some instances be automated, or, in other instances, manned by administrators or knowledge workers. An object memory **275** is a single file containing all of the objects which represent all of the communication center's stored interactions.

IOM **253** is run in much the same way as a standard relational object model as is known in the art, except that it is confined to text data and capable of multi-tasking (performing multiple simultaneous and unrelated functions) with respect to multiple system access. Another marked difference from a standard object model is the data mining functionality **267**. In a preferred embodiment, function **267** may be used to add additional data to IOM memory in real time.

IOM **253** uses metadata, meaning data about data, in it's abstract representation of hard data files stored in repository **263** similar to other data warehousing systems. Such meta-data may be, in some embodiments, compressed in memory for economy in storage. In a case such as that described above, a compression and decompression function would be added to IOM **253**. IOM **253** utilizes memory area **275** for storing metadata objects a–z as illustrated. Metadata objects a–z, as illustrated, each represent a single transaction or interaction file stored in repository **263**. Hence, the number of actual objects stored in memory **275** will equal the number of interactions stored in repository **263**, if every stored transaction is shadowed in the IOM.

IOM **253** is innovative in the fact that it is an object model interface used as an accessible abstract representation of hard data files. Therefore, data-interaction systems may typically utilize IOM **253** in performing their dedicated functions without accessing any hard data stored in repository **263**. The inventor knows of no system wherein data systems may obtain stored information to aid their dedicated functions in the manner and with the apparatus described above.

Memory **275** is typically located in repository **263** as is the rest of IOM functionality as illustrated via directional arrows emanating from repository **263** and pointing to a separate IOM **253**. Software adapted to communicate with IOM **253** (not shown) may reside in each of the data-interaction systems **255–261** as illustrated via directional arrows pointing to API function **271**. The above described relationship is not specifically required to effect the goal of the present invention, but rather preferred in it's practice. IOM **253** may reside on a separate database that is linked to repository **263**. Similarly, API function **271** may contain all of the necessary components for interface with all communication center data-interaction systems without requiring each system to host software. There are many differing architectural possibilities.

According to an embodiment of the present invention, IOM **253** is continually updated in real time as interactions may be stored or deleted in repository **263**. Rules-based routines determine what type of data will be used in each meta-data object stored in memory **275**. Typically, enterprise important information such as client ID, client parameters, transactional analysis (such as profitability rating), credit rating, and so forth, will accompany more interaction-specific data, such as media type, interaction date, participating party ID's and their parameters, and any parsed information specific to the interaction and known to be required by one or more of the automated services. Interaction-specific information may include interaction purpose or goal, interaction results such as purchase information, resolved issue information, and so on.

Memory objects, such as objects a–z representing interactions, are not only identified with regards to involved parties as previously described, but may also be identified and associated according to the common thread order of interaction as represented in repository **263**, or more specifically, the text-based portion which is threaded dialog.

It will be apparent to one with skill in the art that an IOM such as IOM **253** may be utilized with databases other than repository **263** without departing from the spirit and scope of the present invention. For example, IOM **253** may also be used as a system interface to product information databases, external knowledge databases, or virtually any other database such as may be connected to CINOS or a similar operating system.

FIG. **13** is a flow chart illustrating interactive steps associated with IOM functionality according to an embodiment of the present invention. The following basic example of IOM functionality is meant to illustrate just one possible sequence of logical steps taken when utilizing IOM **253**. This example should in no way limit the present invention in terms of the broadest scope to which the present invention should be afforded.

In step **277**, a request to access an IOM such as IOM **253** of FIG. **12** is received from a data-interaction system such as RT SYS **259** of FIG. **12**. In step **279**, the IOM is activated to receive commands related to a dedicated operation or pre-defined process. Activation in this sense is defined as activation to receive from or communicate with a specific requesting system.

In step **281** commands are sent to the IOM for the purpose of initiating IOM functions as may be desired. In step **283**, the IOM performs the requested function or functions. In this case, the function or functions are adapted to provide information to be used in routing of a new interaction. A simple example of a routing-related function would be to return the information associated with the identified client's last 5 interactions in order to determine a best fit agent to accept the new interaction. If it is determined that the last 5 interactions are leading to a purchase, and the prominent agent involved in the last 5 interactions is identified, then the new interaction may be held for that agent in the hopes that statistically, he is more likely to obtain a new order from the client. However, if the last 5 interactions are stagnant or leading away from a purchase, than the interaction may be routed to a new agent, perhaps with more skill at motivating clients to buy, and so on.

In step **285**, displayable results from performed functions are returned to requesting systems. In some instances, results will not be required to be human readable or to be displayable on a monitor. However in other instances, this may be required such as an instance wherein data about a client is forwarded to the receiving agent ahead of the clients interaction.

It will be readily apparent to the skilled artisan that the process steps described above may vary in number and description according to type of business, type of data-interaction system requesting information, enterprise rules, and type of data accessed. This basic example is meant to provide a broad scope of functionality.

Interactive Modules for Managing Business Processes

In a preferred embodiment of the present invention, a multimedia communication center operating CINOS according to previous co-related embodiments is provided, as part of CINOS, a means to initiate and manage various business processes related to communication workflow. Such business processes are defined as enterprise-created applications, procedures and so forth, that are adapted to return a result or provide a solution regarding an issue or request made by a client or other entity.

As briefly described in the background section above, in a multimedia communication center it is desired to automate business processes where possible and to be able to break down the processes into tasks and sub-tasks that are strictly controlled and timed. Prior art network systems require considerable human intervention while proceeding with a business process while, for example, a client waits for a resolution. Similarly, more time is consumed because actual media and hard data may be accessed and processed without the benefit of an abstract representation of data (metadata) as discussed above relative to an interaction object model (IOM). Therefore, an Interactive Process Model (IPM), is provided as a generic programmable module, which when complete, represents and conducts a defined business process. An IPM according to this invention has ability to obtain data from an IOM and to manage business applications in terms of timing and execution of main tasks and sub-tasks that are programmed according to enterprise rules.

FIG. **14** is a Gant table illustrating a pre-defined business process according to an embodiment of the present invention. A Gant table **287** represents the tasks and sub-tasks of a business procedure, in this case qualifying an exemplary loan application, as they might appear on a programmers screen after an automated execution sequence has been completed. Gant table **287** will hereinafter be termed Interaction Process Model (IPM) **287** for the purpose of simplifying explanation.

IPM **287** is a programmable interactive engine as previously described. That is, one may program IPM **287** according to various tasks and sub-tasks that may be required for the execution of a particular business process. After basic programming or set-up, IPM **287** has the capability of accessing data from, among other possible sources, the IOM described above, and using that data in the execution of it's intended goal. IPM **287** is innovative in the fact that it begins as a generic object model (for example a COM container) in which a programmer may add specific functionality (COM objects) to create a functional interface engine or model that may execute a timed business procedure according to enterprise rules.

Although IPM **287** is, in this case, a loan application process, such an IPM may be programmed to execute virtually any conceivable business process that an enterprise may offer as a wholly or partially automated service to clients. IPM **287**, in this example, is presented as a series of rows and columns comprising entry fields and return fields in a GANT chart. For example, before the desired functionality is inserted into IPM **287**, it is a generic COM model that is adaptable via programming for various business processes and resource interface as previously described. It will be apparent to those with skill in the art that a COM model and a GANT form are each simply exemplary of known devices that may be employed in practicing the invention

The format of entry and return fields presented herein is not required to practice the present invention. The inventor merely deems this particular format to be friendly to a programmer building the model and analyzing the returns such as may be displayed on a computer screen. A tool kit aids a programmer with building and fine tuning an IPM such as IPM **287**. Such a tool kit may be part of the programmers desk-top CINOS application such as perhaps tool kit **125** of FIG. **4**, or may reside in and be accessible from a server hosting a CINOS Manager application such as server **77** of FIG. **1**.

FIG. **14** is a GANT chart for a process executable by a CINOS operating system according to an embodiment of the present invention. This chart in this embodiment is an interactive input and display and editing interface wherein a programmer may program a business process having discrete steps and sub-steps. It will be apparent to the skilled artisan that such an interface is but one of a number of interfaces that would be suitable for the purposes of the invention, and is meant to illustrate features of the invention. Broadly speaking, by listing steps of a process in this chart along with parameters to be described more fully below, an application module is created which, by execution, performs the process step by step, and tracks completion of individual tasks, as well as providing reminders when and if allotted completion times are pending or exceeded, and so forth. It will be apparent to the skilled artisan that GANT processes may also be illustrated by flow diagrams (typically PERT charts), and, in a preferred embodiment, the chart depicted in FIG. **14** may be converted to an editable GANT flow chart as well. For Example, standard products like MSProject Planner may be used to generate a PERT or GANT chart, and by using certain labels both for steps and resources, the generated file may directly become an IPM Object.

Referring again to FIG. **14**, a title row **289** comprises column headers and a link to a pop-up editing window that provides for entering steps and necessary parameters. The pop-up window in a preferred embodiment has input fields for entering task numbers, specific action for the task, sequence and pre-requisites related to other tasks, allotted time to complete, and notification parameters, as well as a Cancel and a Save function. Through the input window a programmer can design and relate all tasks and sub-steps needed for a process.

Because IPM **287** is a container for COM objects, task objects may also be loaded as required by the programmer in order to set up the main and sub-tasks inherent to the process as previously described such as by drag and drop method as is known in the art. For example, certain objects or modules to be inserted are for access to certain data from the IOM, while other objects are adapted for accessing certain other databases or resources, or for performing certain process-related functions.

A variety of notification/command modules may be inserted into IPM **287** according to possible results or states that may appear during process execution. The actual module that will be invoked will depend in part on the programmer, and in part on the process sequence. Some of the windows are return windows that return results during execution of the process. These are windows in the columns labeled time begin, time end, and actual time.

In this embodiment, as a programmer enters new steps and sub-steps in building a new application module, the step numbers with name and generic parameters appear as new rows. When the last step is entered and configured the GANT chart is complete, and the process is ready to invoke and execute.

A completed chart is editable in the sense that steps and sub-steps may be altered, added, deleted, and the like, along

with names, allotted times, action parameters, and the like. A programmer may therefore select an existing application module and edit it to save as a new application module.

When a module is complete the application created may be stored and related to other tasks such that the application may be called whenever necessary to perform functions for the operating system. Such processing will typically be transparent to agents, clients, knowledge workers and the like, but on certain occasions, by need, a chart may be displayed while a process is running or for other diagnostic purpose.

In general, building modules (objects) contained in a programmers tool kit are generic to the basic processes being created by the enterprise including standard interface and command objects to other resources or CINOS systems. These building objects used to program IPM **287** may be provided by the provider of the CINOS system according to the general type of business and system architecture used by the enterprise. In one embodiment, an enterprise programmer may create the building objects according to desired enterprise functionality and custom CINOS architecture. Therefore, one CINOS system software package may be provided specifically for a loan company while another CINOS system software package may be provided for an investment firm and so on.

Referring now back to FIG. **14**, as a programmer defines steps and sub-steps as tasks to be performed, he/she is setting up the main tasks and sub-tasks that the application will perform when executed. In this particular example, task **1** is a pre-qualification task for a loan as evidenced by the name Pre-Qual in window **291** in the Name column.

Task **1** comprises 3 sub-tasks, namely sub-task **1***a*, sub-task **1***b*, and sub-task **1***c*. Sub-task **1***a* comprises a module for obtaining data from a general credit field such as may be stored in a database and represented via metadata in the IOM described above. Hence, sub-task **1***a* would comprise the necessary modules or objects for interface with the IOM previously described above and for obtaining general credit data which may be an enterprise rating system code derived from actual credit reports. Additional related data may also be accessible in step **1***a* a such as a list of creditors, payment history, and so on. Step **1***b* provides access to data about credit to the enterprise, and step **1***c* provides access to data about income such as total monthly income, source of income, etc. In this way, main task **1** may be completed by executing the sub-tasks **1***a*–**1***c*.

In building an IPM such as IPM **287**, a goal is to provide an interfacing process application that may execute and perform an entire business process from start to end according to CINOS constraints, time constraints, and enterprise rules. Once completed, tested, and fine tuned, an IPM such as IPM **287** may be used as a functional model for the business process that it represents.

Column **293** represents a time that each step and sub-step begins executing within the CINOS system. Numerals illustrated in column **293** represent units of time expired as the process is executed. For example, Main task **1** named Pre-Qual begins at 0000 (the time that the application is invoked). A client who is requesting a loan via telephone or other media may invoke IPM **287** thus beginning it's automated execution while the client waits in queue. In some embodiments, wherein a client is not live in queue, an agent may initiate the process based on a not-live request such as an e-mail or fax. In general the time displayed in windows under TIME Begin are returns only, based on the actual times related and previously required steps are completed. That is, typically a task will not begin at a fixed time from 0000, but will begin as soon as pre-requisite tasks are all completed.

Windows in column **295** show the time that a step actually ends. This is typically a return window as well, and the time displayed will be the begin time plus the task elapsed time to completion. The programmer typically allots a time for each task, and the actual time may be more or less than the allotted time. Other actions may be invoked in the case that the actual time exceeds the allotted time.

All sub-steps under a main task typically are allotted time increments (according to completion goal) of the allotted time for the main task such that the their sum equals the time allotted for the main task. The purpose for allotting time segments for each task and sub-task is so that efficiency improvements may be pursued with regards to client waiting and system performance and that interfaces with other systems such as routing systems or the like are handled smoothly. The time allotments, as described are in effect, time goals set by the enterprise. Time modules (not shown) are COM tools inserted by the programmer.

Windows in column **297** represents return fields that return actual elapsed times associated with each task and sub-task. For example, Main task **1** (Pre-Qual) began at time 0000. Allotted time for main task **1** is 0010. Main task **1** was actually completed at time 0008 or 0002 ahead of schedule. As is the case with column **295** (Time End), times in which the associated sub-tasks are completed are increments whose sum equals the actual time for the main task to obtain completion.

Windows under column **299** contains notification fields under the name-field Notify, which is part of title row **289**. If there are no problems in the execution of a task or sub-task then notification is given to go on to the next task or sub-task. However, if there are problems in execution such as operation time out, or insufficient data for return, then a suitable notification-command may be given to the system such as return to agent, repeat prior task or sub-task, and so on.

It is important to note here that according to enterprise rules, notification may include stopping the process and requesting human intervention, allowing more allotted time for a task or sub-task to complete and then repeating the task or sub-task, or any variety of other options.

In this example, IPM **287** comprises 4 main tasks of which main task **1** has already been described. Main task **2** is determination of loan type. IPM **287** may comprise tasks or sub-tasks that may be executed in parallel under certain circumstances. Such is the case with part of main task **2** or more specifically sub-task **2***a*. For example, choices and data regarding loan type, amounts of loan, purpose for loan, and the like may be held in a separate section or database such as product database or the like. Therefore the multi-taskable IPM **287** may begin main task **2** upon invocation at time 0000. However, because a sub-task **2***b* requires the same data obtained with regards to main task **1**, it cannot begin until main task **1** is complete or at 0008 as indicated in column **293**.

A sub-task **2***b***1** is depended from sub-task **2***b* and is a data sorting operation. An example would be the sorting of assets from liabilities. Sub-task **2***c* allows insertion of data on a selected interactive or multimedia loan application in an automated fashion. Hence, the first 2 Main tasks and their associated sub-tasks pre-qualifies a client and obtains and inserts required data into an interactive application. For the purpose of this example, there have been no errors or

problems with the first 2 main tasks allowing all notifications to proceed with the process without human intervention.

IPM **287** includes a main task **3** for post qualification and data validation. Such a task may be required according to enterprise rules with a system recommendation to be returned regarding weather or not a particular client should qualify. It should be noted here that a small amount of time elapses between a main task and a first sub-task with regards to main tasks **1–3** this is meant by the inventor to show system preparation time to execute to first sub-tasks.

Under main task **3**, a sub-task **3***a* validates income. For example, a client's income data, instead of being current, may be out of date according to a time constraint imposed by the enterprise for updating income data in a database. If this is the case, then a suitable notification may be made to the system. The process may be temporarily halted due to the notification while an IVR interacts with the client to provide more current data. After the client has provided the data, it is updated to the IOM and sub-task **3***a* may be repeated. In some embodiments, subsequent tasks or sub-tasks in a process may be executed while an IVR solicits more data from the client provided that they are not critically tied to the problem task or sub-task that could not be completed.

A sub-task **3***b* validates the applicant's source of income, perhaps by accessing a current database containing employment records provided by the client's employer. In one embodiment, an automated out-dialer may be used to contact the employer. When connection is made, the call may be transfer to an IVR or a live attendant so that validation may be completed. In some cases this will take more than the allotted time shown in this example because human intervention is utilized. In such cases where it is known or perceived that human intervention will be required, then more time will be allotted for the planned purpose. However, if the required data is supplied ahead of the loan application and stored for access by IPM **287**, no human interface will be required.

Similarly, a sub-task **3***c* may prompt the client via IVR or live attendant for inclusion of any added income such as may not be indicated in data storage such as spousal income, an additional job-income source, and so on. Such IVR or live attendant interaction may be part of the loan procedure with appropriate time allotted to complete such procedures and not specifically the result of a problem or notification. Therefore, the amount of human intervention included in a business process such as represented by IM **287** may be dictated by enterprise rules.

A sub-task **3***d* calculates the debt to income ratio and other required calculations or manipulations of data and then makes a system recommendation, based on the calculation and enterprise rules, to the agent to which the client will be transferred for closing. Hence, the notify field for sub-task **3***d* is labeled present. Upon receiving the present notification, the system forwards the information (completed loan application) to an agent ahead of the client's call. An interface to the automated routing system enables IPM **287** to determine which agent will receive the client out of queue.

A main task **4** is simply to display, on an agent's graphical user interface (GUI) a completed copy of the loan application associated with the client's identification and incoming call. The notification field returns END at task **4** because it is the end of the procedure. At this time, a copy of IPM **287** with all of the fields complete may be sent to the programmer or system administrator as indicated on a top row comprising the label field (loan application), Time begin field (0000), Time End field (00305), Actual Time field (00255), and an update notification option labeled Update.

In this example, the actual time of 00255 for completing a loan application and routing it to an agent is 0005 ahead of the allotted time or goal time. The programmer may elect to update IPM **287** as the most efficient model yet created thereby using it again for subsequent applications, or he may elect to fine tune IPM **287** further based on the information provided in the returned model.

Each Interactive Process Module created is adapted to operate with a CISNOS operating system according to the present invention. As such, each completed module is callable by the OS when needed to perform its programmed function. Further, each module is provided with one or more inputs to be able to perform its function. In the example of qualifying a loan applicant as described above, the required inputs will be such as (a) potential borrower's identity, (b) type of loan desired, (c) amount of loan requested, and (d) payback period requested. Moreover, each module is adapted to interact with other CINOS modules. For example the loan qualification application described is adapted to access other modules, such as the IOM, using the potential borrower's ID as a key, to recall information, such as income information. Generally speaking, process modules will have, then, certain commonalties, such as at least one defining input, a task to be performed based on input, and a result to be returned, as well as a facility for returning the result. Such results may in some cases be Yes/No, a recommendation or the like, and may be either displayed for a recipient or used as a further input to another Interactive Process Module.

It will be apparent to one with skill in the art that one IPM may be employed for one business process containing various secondary alterations to the generic process without departing from the spirit and scope of the preset invention. For example, a mortgage loan may have differing tasks and sub-tasks than an auto loan and so on. However, because access to system repositories and resources are similar in most loan processes regardless of type or amount of loan, modules may be inserted that cover the options. Moreover, separate business processes may be run from one IPM as long as the required modules are present and operational.

It will further be apparent to one with skill in the art that the present invention may utilize a convention other than COM such as by Java applett or the like.

As previously described, IPM **287** is innovative in part because a generic application or model may be used for building several differing automated processes, and because it breaks down a process into tightly controlled tasks and sub-tasks that are executed in concert through interface with other CINOS systems. As a result, complicated business processes may be executed within CINOS much faster and more efficiently than with prior art systems. Furthermore, processes may in many instances be wholly automated and integrated with system routing and other intelligent services.

Diverse Interaction Model

In a preferred embodiment of the present invention, a multimedia communication center is provided, as part of CINOS, including an interface engine or model that allows communication-center interactions resulting from diverse interaction paths to be recorded and entered as threaded dialog in concert with threaded dialog from more conventional interactions such as are recorded and entered via multimedia threading as described above.

For the purpose of this specification, a diverse interaction path means a non-routine, or less-routine type of commu-

nication path that is typically more complicated than a conventional interaction path such as a multi-agent conference or in-place discussion regarding an enterprise client or issue generic to the client. Another example would be simultaneous communication between two or more agents with outside vendors to assist a client who is live and in queue. Yet another example would be a multi-client discussion group organized around a commonly shared issue or product. It is desired that such dialog or dialogs including associated media is made a part of an accessible contact history wherein the diverse interactions may take their place among the more conventional interactions making up a customer or issue-specific multimedia thread in a database or contact history.

CINOS manages traditional interactions according to a multimedia threading technique taught above wherein various methods, including the use of a live attendant, are used to record, parse and enter interaction data into the contact history. Such dialog is threaded and associated with actual recorded media through use of icons or links whereby, upon interacting with such links or icons, one may have access to actual stored media. However, as interaction paths become more diverse and complicated, as in the examples provided above, it becomes apparent that added functionality and innovation is needed to enable efficient organization and recording of such data into the contact history so that not only are primary dialogs and associated media simple to access, but also secondary dialogs and media resulting from more diverse interactions.

Interaction dialogs among second and perhaps third parties involved in a transaction, such as perhaps a contract negotiation, may occur simultaneously and, in many instances, without inclusion of the primary parties to the transaction or negotiation. Therefore, the prospect of logically including those dialogs among the primary dialogs on a client or issue identified thread is more complex. In one embodiment of the present invention, such functionality is provided via a unique event handler adapted to identify and organize such dialogs so that they may be associated along the proper thread or threads in a contact history.

FIG. **15** is a block diagram illustrating functionality of an exemplary diverse interaction model (DIM) according to the present invention, and it's relationship to other elements of an operating system such as the CINOS system described herein. In this particular example DIM **301** is provided as an open interface capable of asynchronous interfacing between live interactions and other CINOS interfacing engines such as the IOM and the IPM described above. In one implementation, as a COM model, DIM **301** is a programmable interface wherein functionality may be installed according to specific enterprise rules.

The example provided herein is meant to represent just one possible interaction set that may be tracked, recorded, and made a part of a contact history of a communication center utilizing CINOS. Diverse interactions, as previously described in the background section and described with examples above, may include virtually any conceivable interaction or group of simultaneous interactions that may comprise more than a simple one-on-one interaction whether incoming, out-going, or internal communication using any supported media.

Also, the exemplary DIM of FIG. **15** is shown with a number of functional code sets for accomplishing certain ends, such as assigning ID to transaction partners and the like. In FIG. **15** these functions are shown as within the boundaries of the DIM. This is not meant to limit the DIM model to having complete code sets as a part of each DIM. In reality, such code may be programmed as a part of a DIM in some instances, and in other instances the DIM is provided with ability to call and use existing code in CINOS. CINOS, as described elsewhere in this specification, has, for example, functional code for tracking commitments and reminding parties to commitments of approaching and expired time deadlines. DIM modules may be adapted to call this and other such operating code to accomplish purposes of the particular DIM. The location of functional code examples in FIG. **15** should therefore be taken only to represent the existence and use of the code, not whether or not the code is resident in the DIM.

Referring again to FIG. **15** for exemplary purposes, assume that a customer **305** who is a subscriber to CINOS is engaged in a purchasing process with a communication-center agent **1** as illustrated via indicated link **306**. Perhaps customer **305** is negotiating to purchase a turn-key machine shop operation that is being put together as a package by the hosting enterprise. There are, in this example, two other agents involved in the process. These are agent **2** and agent **3** as illustrated. In order to provide a complete package to customer **305**, the enterprise must enlist the cooperation of **3** outside vendors who will each provide key components of the package. These are vendor **1**, vendor **2**, and vendor **3**. For the purpose of this example, it will be assumed that vendors **1–3** are not subscribers to CINOS and are not connected to CINOS, although in some embodiments, they may well be subscribers connected to a CINOS-driven system.

A data repository **303** is provided as part of the CINOS architecture and is adapted to store multimedia and text-based interactions as well as providing an accessible threaded history of communication-center dialogs. Repository **303** is analogous to repository **187** of FIG. **7**. As such, it is logically divided into two sections, one for storing threaded dialog, and text-based media (Text-based Data), and one for storing recorded multimedia interactions (MIS Database) such as may have occurred with respect to enterprise activity.

As customer **305** converses with agent **1**, the conversation is being recorded and entered into MIS database while a text version is being installed on a dialog thread assigned to the customer in the Text-based data section of repository **303**, as described above. The recording and storing of this simple interaction is accomplished as described with respect to embodiments presented with reference to see FIG. **7** and the text describing FIG. **7** above. However, interactions between other involved agents and vendors are important to the enterprise in terms of selling the machine shop, and to the customer in terms of insuring that every angle is covered with respect to his planned purchase.

DIM **301** allows these additional diverse interactions to be recorded and included on the dialog thread belonging to customer **305** in repository **303**. DIM **301** is adapted, in this embodiment, to assign CINOS identification code to each outside vendor such as vendors **1–3** as illustrated via a function module **309** labeled as Temporary Vendor ID. This identification may be accomplished in a variety of ways such as perhaps attaching a unique code to a vendor's parameters which may include phone numbers e-mail addresses, IP addresses, company titles, etc. The identification may be temporary, such as for a time period covering a series of planned interactions, or permanent depending on enterprise rules. In this way, CINOS may track and identify all communications to or from vendors **1–3**. Because agents **1–3** and customer **305** are subscribed to CINOS, they have permanent identification as do all their enterprise interactions.

Part of DIM **301** allows for in-place agent collaboration or discussion via function module **307** titled Agent Collaboration. Function module **307** may be an existing multimedia chat program that may be based in a variety of media such as audio, video/audio, or text. Agents **1–3** are illustrated herein as engaged in collective collaboration via module **307**. An on-screen computer discussion would be a likely venue for such collaboration.

Agents **1–3** in this embodiment are illustrated as being engaged in conversations with vendors **1–3** respectively as illustrated via links connecting the agents and the vendors. For example, agent **1** may be conversing with customer **305** via COST phone, while engaged with vendor **1** via DNT phone such that the DNT conversation is not audible to customer **305**. This may be accomplished via methods known in the art such as a progressive hold button or switching device. Agents **2** and **3** are similarly engaged with vendors **2** and **3** respectively. In this case, agents **1–3** are soliciting assurances that vendors **1–3** will have no problems with availability and delivery of their respective parts of the turnkey package. Perhaps exact parameters are being worked out as well such as just-in-time delivery date assurances and so on.

As agents **1–3** obtain required information from vendors **1–3**, they are collaborating and sharing the information via in place discussion through interactive function module **307**. As the agents finish collaborating, agent **1** may relay such information as may be desired to customer **305** via COST connection and perhaps acquire a purchase order for the machine shop. Hence, a complicated series of interactions with multiple parties has transpired in a comparatively short period of time in order to aid customer **305** in making a decisive purchase without ongoing and periodic communication being necessary over a much longer time. It should be noted here however, that multiple simultaneous interaction as illustrated in the example is not required to invoke the aid of DIM **301**, or to practice the present invention. The inventor intends only to show that invoking DIM **301** to aid in organizing and threading dialog from the above described diverse interaction may be beneficial in this instance. The exact parameters and functionality of DIM **301** will of course depend on enterprise rules.

Coordinating and threading dialog from the multi-party interaction is performed, in this embodiment, via DIM **301** as was previously described and will be further detailed below. Supplied interface modules within DIM **301** provide command capability to other CINOS routines. One of these modules is an IOM interface **311** that may obtain data from the IOM regarding customer **305**, vendors **1–3**, or other related data, and relay such data to agents involved in the above described transaction such as agents **1–3**. Similarly, an IPM interface **313** may obtain data such as may be processed in conjunction with any automated process that customer **305** is engaged in and mirror such data to agents **1–3** as may be required. An example would be perhaps mirroring data processed by an IPM handling the customer's overseas shipping information or the like.

Because each participant to the dialog is identified, and all of the interactions are identified, they may be time-stamped and organized according to such identification or identifications by an interaction sorter module **312**. Agent **1** and customer **305** may, in some embodiments, maintain priority on the thread in which the turnkey purchase dialog is a part. However, because the threaded dialog supports multimedia, and may accept additional information, secondary dialog resulting from agents during collaboration and agents to respective vendors may be inserted onto the customer's thread according to any enterprise rule. Interaction sorter **312** may organize the secondary interactions according to identification parameters, add a time stamp, and sort according to chronological order. If simultaneous interactions are taking place such as was the case in this example, then they may be sorted by involved agent ID and threaded sequentially as dialog groups such as all interactions of agent **1**, followed by all interactions of agent **2**, followed by all interactions of agent **3**, followed by all agent collaboration dialog.

The dialogs may be logically inserted on the thread of customer **305** via a dialog insert module **314** which is a command interface to various data entry systems such as may be associated with speech to text converters, automated fax systems, e-mail systems or the like. Module **314** may also provide entry paths to live attendants for latter entry after transcription of video or the like.

Insert dialogue module **314** may, in some embodiments, provide for secondary dialog to be entered on hidden threads marked by interactive icons or markers inserted and adapted to reveal the hidden dialog when selected, such as with a pointer device. In this way, primary agent-customer dialog may be viewed separately from intermediate agent-to-agent collaborative dialog, dialogue with third parties, and so on. Interactive icons may also accompany such dialog for the purpose of calling up primary recorded dialogue. In this way a system auditor or other worker may review an involved transaction to insure that nothing was missed or overlooked by various parties to the transaction. Also an accurate record may later be printed out if required to settle a future dispute or unresolved issue related to the transaction.

As an open interface, DIM **301** may be adapted to handle multiple unrelated interactions as they may occur within a multimedia communication center. In another embodiment, separate DIM's may handle separate diverse interactions. Similarly, there are many possibilities regarding the location of a DIM within CINOS architecture. For example, DIM **301** may be part of a CINOS manager application such as described with reference to server **77** of FIG. 1 (P3313PA). Moreover, DIM **301** may be adapted to handle only diverse interactions as defined by enterprise rules, or may in fact handle all communication center interactions.

A schedule and reminder module **315** is adapted to notify CINOS when an identified party to a transaction must fulfill a promise or scheduled task associated with a transaction or negotiation. A universal CINOS data and time function tracks all recorded interactions and ages them accordingly much like a computer operating-system time and date function. If a specific interaction involving a scheduled promise approaches deadline, then notification arrangements to the responsible party may be made ahead of time. A notification interface module **317** alerts an automated message system which may be part of repository **303**, or held separately on the network, to send notification of the commitment to involved parties.

The DIM described above is illustrated according to a particular diverse interaction situation involving a customer and multiple agents and vendors. A multitude of differing interaction paths may, however, be supported and enhanced. For example, a DIM may be programmed in a manner that customers purchasing particular product may be automatically logged into a discussion group existing for the purpose of interactive technical support among customers. In this example, the discussion group can be a WEB-based chatroom, a video-conferencing facility, or may support any other medium supported by the CIOS system. In addition to

allowing the customers to interact through the MMCC, many enhancements may be provided specifically to such a group, such as database access to technical information and the like pertinent to the particular product

As another example, outside businesses, such as vendors and the like, identified in the CINOS system may interact with one another for defined purposes through a customized DIM in CINOS. In this case, vendors 1 and 2 in FIG. 15 may have an interdependency in supplying parts or services for a CINOS-managed process or project. A DIM may be set up quickly and easily allowing the two vendors to cooperate and to access certain information in the enterprise data repositories related to the defined purpose of the DIM and the project.

It will be apparent to one with skill in the art that a DIM such as DIM **301** may comprise additional or fewer modules, or modules of a differing function than the ones illustrated herein without departing from the spirit and scope of the present invention. For example, additional interface modules may be added and adapted to interface with other CINOS routines such as routing functions or other automated services. It will also be apparent to the skilled artisan that vendors supplying the enterprise with products destined for customers may or may not be utilizing CINOS systems without departing from the spirit and scope of the present invention. For example, vendors 1–3, in this example, may receive automated and scheduled notification for just-in-time delivery or the like via notification interface **317** if it is operationally interfaced with a CINOS out-bound out-dialer application.

It should also be apparent to one with skill in the art that CINOS interpretation of a diverse interaction as opposed to a conventional interaction may be programmed according to enterprise rules without departing from the spirit and scope of the present invention. For example, a one-on-one interaction of any media type may be considered by an enterprise to be a conventional interaction with the dialog entered as such while the addition of multiparty side discussions may be considered a diverse interaction associated with the conventional interaction thus invoking a DIM such as DIM **301**, and so on.

Invocation or initiation of a DIM such as DIM **301** may occur at the planned beginning of such interactions, or at such time that a conventional interaction may become a diverse interaction with the addition of, perhaps more than one party to the interaction. In one embodiment, a transaction monitor or monitors such as are known in the art may be used to identify the number of parties in an interaction, or perhaps the type of interaction based on enterprise rules, and be adapted to notify a DIM such as DIM **301**.

In one embodiment, CINOS may be shared by distinctly separate organizations who must collaborate and provide infrastructure in order to complete a vast project or mission such as perhaps building and launching a space station. Many specialized groups involved in such a process may hold diverse interactions comprising multiparty discussions, interactive seminars, cost accounting meetings, or other like collaboration without physically gathering to hold such meetings. Such implementations may be largely temporary and customized according to requirement. A DIM in this case would be responsible for identifying and providing instruction for entering and threading such dialog resulting from the multiparty interactions into a central repository shared by all participating organizations.

Specialized Threaded-Dialog Model

According to a preferred embodiment of the present invention a unique programmable event handler is provided, termed a specialized threading model (STM) by the inventor. In addition to logically inserting dialog from diverse interaction paths to associated customer threads and the like as described with reference to the section entitled Diverse Interaction Model, it is also desirable to create special threads (associations) derived from stored and real-time data records, which may be used for temporary or ongoing research. Therefore, an STM is provided as a programmable-interface application which allows a researcher to find and study information shared within and through CINOS according to very specialized criteria.

The term Model as presented herein and associated with other COM-based interface engines or applications such as the above described IOM, DIM, and IPM, is used to describe COM-based software models wherein functional software modules and/or objects may be installed in order to create the larger functional software module which is called in the art a COM model. It will be apparent to the skilled artisan that functional modules, as will be illustrated as located within an STM as taught below, are not limited to residing within the described model, but in many instances, may be existing code-sets or routines generic to CINOS and resident in other parts of interfacing software. These code-sets or routines may be initiated or invoked by a module from within the described model as will be further explained below. It will also be apparent that the COM-object implementation is exemplary, and other programming techniques may be used within the spirit and scope of the invention.

FIG. **16** is a block diagram illustrating an exemplary Specialized Threading Model **319** according to an embodiment of the present invention. Model (STM) **319** is provided as a programmable tool (software application) operable in CINOS that may be invoked and used by a researcher or other authority for the purpose of conducting specialized research by associating stored and real-time data. A researcher **320** may execute a programmed STM from a PC/VDU such as PC/VDU **322**, as illustrated via expansion arrows emanating from PC **322**.

A communication-center data-repository **321** is provided for the purpose of warehousing data and is analogous to previously-described repositories such as repository **303** of FIG. **15**. Repository **321** is logically divided in many preferred embodiments into two sections for data storage. One section (Text-Based Data) contains all of the communication center's threaded-interaction dialog and text media. The other section (MIS Database) contains all of the recorded multimedia associated with the dialog stored in the text-based section. It will be apparent to one with skill in the art that there may be additional repositories or databases held in separate locations on the CINOS network without departing from the spirit and scope of the present invention. The inventor chooses to illustrate only one such repository for the purpose of simplifying explanation. Also indices to or abstracts of such databases may be used, rather than databases themselves.

STM **319** may access stored text data from repository **321** (Text-Based Data section), stored multimedia data from repository **321** (MIS Database) and, in some cases, live text or multimedia data such as may be occurring during live interaction in a multimedia call center. Such live interactions as described and illustrated in this embodiment include interaction **329** which is a chat room having four customers engaged in interactive communication, for example, in dialog concerning a mutually purchased product (internal-hosted by the enterprise). An interaction **323** is illustrated and involves a customer and an agent wherein, for example, the customer has initiated the interaction (incoming). An

interaction **325** is illustrated and involves two outside vendors wherein, for example, the vendors are subscribed to CINOS and discussing details of a joint just-in-time (JIT) shipment to the enterprise (external). An interaction **327** is illustrated and involves an agent and a customer (labeled as such) wherein, for example, the agent has initiated the interaction (out bound).

Hereinafter, the live interactions illustrated will be identified by the interaction type and the element number. For example, interaction **329** will be referred to as internal interaction **329**. Interactions **323**, **325**, and **327** will be referred to as incoming interaction **323**, external interaction **325**, and out-bound interaction **327** respectively. The interactions described above are all live and occurring during the run-time of STM **319**. All live interactions illustrated herein are entered into repository **321** as illustrated via directional arrows emanating from each interaction in a direction toward repository **321**. These stored interactions as the real-time interactions are terminated become part of the stored database along with all previously stored interactions and annotated and text versions of such interactions.

As previously described, STM **319** may, through a monitoring process described in more detail below, access live data (dialog) and utilize such data at the time the data is created, or more specifically, before or at the same time that such data is either entered into (text) or recorded into (multimedia) repository **321**. In this way, a unique and innovative method is created whereby dialog associations may be created from stored data with additional dialogs being added to the association in real-time as they occur with respect to live interactions such as those illustrated in this example. Such a process may be executed via STM **319** and run in the background on a PC/VDU such as PC/VDU **322** being used by researcher **320** while other work is being performed. Similarly, STM **319** may reside in repository **321** instead of PC/VDU **322** when not in use as illustrated via expansion arrows emanating from repository **321**. That is, the functionality may be client-server based. In this case, a CINOS-connected agent may invoke STM **319** remotely via PC such as PC/VDU **322**.

Referring back to FIG. **16**, STM **319** is different from the diverse interaction model (DIM) **301** as described with reference to FIG. **15** in that it is expressly dedicated to creating new associations or dialog threads from those already created (and from live interaction) based on implicit instruction from a programmer which may be a knowledge worker, agent, researcher, or any other authorized individual. Such associations may be stored in repository **321** and displayed on a PC/VDU such as PC/VDU **322**.

STM **319** may be created in a generic COM container that is provided along with insertable modules in the form of a desk-top or server-based tool-kit accessible to researcher **320**. Once created, an STM such as STM **319** may be modified through editing for the purpose of performing another task which may differ from the original task. Several STM's such as STM **319** may be created for different research projects and be run simultaneously within CINOS and share the same data and interfaces in an asynchronous multi-tasking environment such as is attributed to CINOS routines.

In the example provided herein, STM **319** comprises insertable modules that are dedicated to performing certain functions or interfacing with and invoking certain physically separated functions or routines that are generic to CINOS. For example, a search function module **330** is provided and adapted to searching stored data for pre-defined key-words or phrases similar to the operation of known search functions or search-engines used on the Internet or by other data functions. Again, this function may be wholly within Model **319** in some embodiments, and Model **319** may call the search function from CINOS in other embodiments.

Search function **330** accepts input parameters entered by researcher **320** such as a word, word association, phrase, Model number, and the like designed to associate otherwise unrelated dialogs. Additional input parameters that may be entered to search function **330** include limits or constraints associated with the type of and area of data to be searched. For example, if a desired keyword association-parameter is "disk-drive, problem, install", and the search area-parameter is customer history database, then search function **330** will look for all dialogs containing the words disk-drive, problem, and install that are stored in the customer history database.

Because threaded dialogs that may be stored in a multimedia communications center operating CINOS have markers or icons associating those dialogs to the actual stored media as previously described under the section entitled Rules-Based Storage and Threading of Multimedia Interactions, search function **330** may be uniquely adapted to identifying these media icons and associating them with the specific dialogs for latter interaction.

An interaction monitor module **331** is adapted to communicate with and send commands to various transaction monitors (not shown) that may be installed and operating within the CINOS operating system and adapted for monitoring live or recent interactions or transactions of various media types. For example, one transaction monitor may be assigned to monitor incoming COST calls, while another transaction monitor may be assigned to monitoring DNT interactions such as IP phone calls. Monitors may also be adapted to monitoring voice mails and other types of recorded voice messages. Furthermore, text-based monitors or text analyzers may be adapted to read and parse text-based messages such as e-mails, faxes, internal memos, or any other text documents that may be made into digital files. In this way, interaction monitor module **331** may utilize the same input parameters assigned to search function module **330** thereby extending it's functionality via command to such monitors and text analyzers assigned to live interactions as well as recent not-live text transactions that have yet to be entered into a repository such as repository **321**.

To illustrate one example of the method described above, suppose that researcher **320** has programmed one key phrase "having a problem with" into search function **330** and programs interaction monitor module **331** to interface the parameters via command to a monitor charged with monitoring incoming COST calls. Upon initiation of STM **319**, function **330** will search stored data for the key phrase while module **331** will instruct the incoming COST monitor to alert the researcher if the key phrase is detected during a live COST interaction. The scope of live interaction and recent transaction monitoring with regards to parameters set by researcher **320** may vary according to the purpose of STM **319**. The advantage of the above stated ability will be more apparent through further description provided below.

An IOM interface module **333** gives researcher **320** an option to access an abstraction of hard data or metadata instead of accessing actual hard data from repository **321** as discussed with reference to the section entitled Stored-Media Interface Engine (Interaction Object Model). A notification interface module **335** provides notification in the form of an audible alert, pop-up window, or even an elec-

tronic page or other form of alert associated with events that may occur during execution of STM **319** that may be of express interest to researcher **320**. Such an alert or notification may occur if, for example, a period for running STM **319** is nearing expiration, or perhaps if a required monitor for live interaction is not on-line. Notification interface **335** may simply notify when a new dialog is added to an association of dialogs, and so on. Module **335** may also be programmed to alert multiple parties or a single party of the occurrence of any notable events that may take place during the execution of STM **319**.

A thread builder module **337** is an engine that creates a new thread or threads according to the parameters entered with respect to modules **330** and **331**. For example, dialogs found by module **330**, that contain the input parameter key-word, word association, or phrase are arranged and associated in a way that is logical to researcher **320** and in accordance with entered input criteria. A dialog sorter module **339** is provided to assist module **337** in this function, although in some embodiments, one module may be created for both functions. Dialog sorter module **339** may accept certain parameters for the purpose of organizing many separate unrelated dialogs according to programmed rules. That is, in addition to being associated by the search parameter, dialogs may be further organized by other input criteria.

In one embodiment, dialog sorter module **339** recognizes the time and date stamp for each dialog and organizes the dialogs adhering to that order. Thread builder **337** then creates an abstract thread or tree-structure associating the dialogs using interactive media icons and stores the new thread (association) in an unused section of repository **321** where it may be later accessed. In another embodiment, researcher **320** may enter overriding input parameters related to dialog sorter **339** that may negate or override existing time and date stamps for a more preferable sorting criteria such as a sort by media association, sort according to original thread identification, and so on.

An interface command module **341** may be installed for the purpose of accomplishing an interface to other CINOS systems such as routing, messaging, out-dialing, automated services, and so on. A display function module **343** allows an interactive picture of the newly created thread, as organized and built via modules **339** and **337**, to be displayed on a PC/VDU such as the researcher's PC **322**. The display may, in one embodiment, appear as an actual tree or thread connecting various interactive icons representing dialog and associated hard media. In another embodiment, the display may be a simple list of interactive text titles. The nature of interaction with the display is such that manipulating the interactive icons with a pointer device, or by entering certain keyboard commands, full text and hard media may be accessed and viewed by researcher **320** from PC **322**.

A hard-media viewing module **345** comprises the necessary viewers for accessing and displaying various media types that may be represented by dialogs and supported within the communication center. Module **345** may, instead of containing actual viewers, simply contain command modules that invoke appropriate viewers installed on PC **322** or otherwise accessible by the PC. Such automated execution modules as module **345** enable the appropriate media viewer to be invoked without requiring manual initiation via PC **322**.

A closing function module terminates execution of STM **319** according to parameters entered by researcher **320**. An example of a closing parameter might be to terminate after a given period of time such as one work period. Other parameters may be entered as well such as terminate when a goal number of target dialogs is reached and constructed on a thread, and so on. Along with termination of STM **319**, created threads or associations may also be terminated or not depending on input parameters. For example, time may be desired after a specialized thread is created for study purposes after STM **319** has terminated it's operation. In this case, perhaps a certain time period allotted for study will elapse before the thread is erased or purged from repository **321**. In some cases, the specialized thread may be permanently stored for review.

It should be apparent to one with skill in the art that the modules represented with respect to STM **319** are only exemplary of the types of modules that may be used in creating STM **319**. There may be more or fewer modules of different function and order without departing from the spirit and scope of the present invention. Moreover, such modules may be executable routines within STM **319**, or simply command modules that notify and execute physically separate routines such as call monitoring routines or the like. In most embodiments a combination of resident modules and command modules may be used.

The advantages of STM **319** are that specialized research or study may be conducted by an agent, knowledge worker, or researcher for practically any type of issue or problem relating to enterprise activity. For example, an STM such as STM **319** may be used to obtain information related to the success or failure of newly introduced products, perhaps pointing to or indicating changes or revisions that may be desired by customers owning the products. STM **319** may be used to gage success of a temporary promotion or advertisement by creating a specialized thread containing dialogs of all interactions about the promotion or advertisement taking place since such time that the promotion or advertisement was launched.

The unique capability of STM **319** to access or intercept live interactions allows agents or researchers to monitor most recent dialogs associated with a subject of research. This innovative technique is especially useful in a fast-paced sales organization wherein many different products are sold over a network. A researcher may chose one product as a subject for an STM such as STM **319**. By running the application in the background, he/she may actively obtain all incoming dialogs related to purchasing that product with such dialogs appearing on a specialized thread in order of occurrence. By programming interaction monitor module **331** with desired parameters, he/she may choose the type or types of supported media from which to select or search dialogs from.

Live interaction may be searched or parsed according to search parameters regardless of interaction type and media. For example, internal interaction **329**, which in this embodiment is an open chat room, may be parsed for any dialogs relating to the search subject entered as a parameter to search function **330**. Incoming, out bound, and external communications in any supported media may be monitored and parsed for search parameters. External communication such as vendor to vendor as illustrated via external interaction **325** may be monitored by CINOS in the event that they are connected to the CINOS network, which in this case may be a network operating system shared by a group of separate organizations.

In the case of transcription of a media type as may be performed by a live attendant, STM **319** may notify the attendant which may, for example, send the newly created

transcript to a text analyzer being commanded via STM **319**. The transcript dialog may then be parsed and associated accordingly.

It will be apparent to one with skill in the art that an STM such as STM **319** may be created to perform a wide variety of research tasks without departing from the spirit and scope of the present invention. For example, an STM may be created to associate dialogs related to a fix to a technical problem as may be discussed among customers, agents, technicians, or the like in chat rooms, via COST interactions, DNT interactions or any other supported media.

In one embodiment, an STM such as STM **319** may be used as a motivational tool for sales agents or the like. For example, by searching dialogs from agent/customer interactions for certain scripted phrases designed by the enterprise for improving customer relations or perhaps triggering a sale, one may determine how often or to what extent these phrases are actually being used by which agents and so on. By comparing such accounts to the agents personal sales records, one may obtain an indication of which phrases are more successful and so on.

Specialized threads created by STM **319** may aid the enterprise in such areas as improving service, increasing sales, streamlining operations, improving customer service, planning future manufacturing, or any other conceivable enterprise endeavor.

It will be apparent to one with skill in the art that one STM such as STM **319** may be programmed to search according to any constraints with respect to media type, area of search, length of time allotted for ongoing dialog association, and so on, without departing from the spirit and scope of the present invention. For example, one STM may search repository **321** and only incoming e-mails and faxes, whereas another STM may be dedicated to obtaining dialog from incoming live interaction but not dialog history as may be stored in repository **321** and so on. Also, rather than just basic searches encompassing keywords etc., natural language or at their emergence, multimedia search engines may be used, that compare a concept to recorded voice, video etc. There are many variant possibilities, many of which will depend upon the type of enterprise and supported media.

It will be apparent to one with skill in the art that CINOS may be implemented in a single communication center, or in a plurality of communication centers linked via WAN without departing from the spirit and scope of the present invention.

It will also be apparent to one with skill in the art that rules may be created which govern access to CINOS without departing from the spirit and scope of the present invention. For example, customers may be required to subscribe to CINOS, and may also be provided with a customer application enabling such access. In another embodiment, access may be given to the general public according to established security rules governing commerce, financial transactions, and other processes.

There are many existing and future implementation opportunities for an interaction operating system such as CINOS many of which have already been stated. The spirit and scope of the present invention is limited only by the claim that follow.

What is claimed is:

1. In a multimedia call center (MMCC) supporting multiple channels and forms of communication and storing call center transactions in a data repository, a threading software application, comprising:

a programming input for a user to enter association criteria;

an access function that accesses at least stored data in the data repository;

a search function that searches accessed data for association criteria, and notes those data entities that meet the association criteria; and

a display function that displays at least indicators of data entities meeting the association criteria.

2. The application of claim **1** wherein the display function displays icons for data entities, the icons arranged in threads or tree structures.

3. The application of claim **2** wherein the icons are interactive icons that, being selected, invoke and render the data associated with the icon.

4. The application of claim **1** wherein the association criteria comprises individual and combinations of key words, phrases, text strings, date of occurrence, time of occurrence, media type, participant characteristics, duration of interaction, and participant initiation.

5. The application of claim **1** wherein the access function allows access to stored data and also an ability to monitor transactions occurring in real time.

6. The application of claim **5** wherein the real time transactions comprise connection-oriented switched telephony (COST) calls, data network telephony (DNT) calls, including Internet Protocol (IP) calls, facsimiles, e-mails, voice mails, and WEB document interactions.

7. The application of claim **1** further comprising a programmable alert function that alerts one or more of persons associated with the MMCC according to programmed alert criteria.

8. In a multimedia call center (MMCC) supporting multiple channels and forms of communication and storing call center transactions in a data repository, a method for conducting data research, comprising steps of:

(a) determining association criteria for relating data entities according to a research need;

(b) accessing the data repository to search stored data for conformance to the determined association criteria;

(c) searching the accessed data entities for match to the association criteria; and

(d) displaying indicators of data entities that match the association criteria.

9. The method of claim **8** wherein in step (d) the display function displays icons for data entities, the icons arranged in threads or tree structures.

10. The method of claim **9** wherein in step (d) the icons displayed are interactive icons that, being selected, invoke and render the data associated with the icon.

11. The method of claim **8** wherein in step (a) the association criteria comprises individual and combinations of key words, phrases, text strings, date of occurrence, time of occurrence, media type, participant characteristics, duration of interaction, and participant initiation.

12. The method of claim **8** wherein in step (b) the access function allows access to stored data and also an ability to monitor transactions occurring in real time.

13. The method of claim **12** wherein in step (b) the real time transactions comprise connection-oriented switched telephony (COST) calls, data network telephony (DNT) calls, including Internet Protocol (IP) calls, facsimiles, e-mails, voice mails, and WEB document interactions.

14. The method of claim **8** further comprising a step for alerting one or more of persons associated with the MMCC according to programmed alert criteria.

* * * * *

US005953332A

United States Patent [19]

Miloslavsky

[11] Patent Number: 5,953,332

[45] Date of Patent: Sep. 14, 1999

[54] **AGENT-INITIATED DYNAMIC REQUEING**

[75] Inventor: **Alec Miloslavsky**, Hillsborough, Calif.

[73] Assignee: **Genesys Telecommunications Laboratories, Inc.**, San Francisco, Calif.

[21] Appl. No.: **08/947,737**

[22] Filed: **Oct. 9, 1997**

Related U.S. Application Data

[60] Division of application No. 08/928,410, Sep. 12, 1997, which is a continuation-in-part of application No. 08/866,357, May 30, 1997, which is a continuation-in-part of application No. 08/802,660, Feb. 19, 1997, which is a continuation-in-part of application No. 08/797,418, Feb. 10, 1997.

[51] **Int. Cl.**[6] **H04L 12/14**

[52] **U.S. Cl.** **370/352**

[58] **Field of Search** 370/352, 353, 370/354, 355, 356, 351, 389, 392, 400, 401; 379/210, 211, 212, 265, 266, 309, 220, 221, 88.13, 88.17; 340/827, 826

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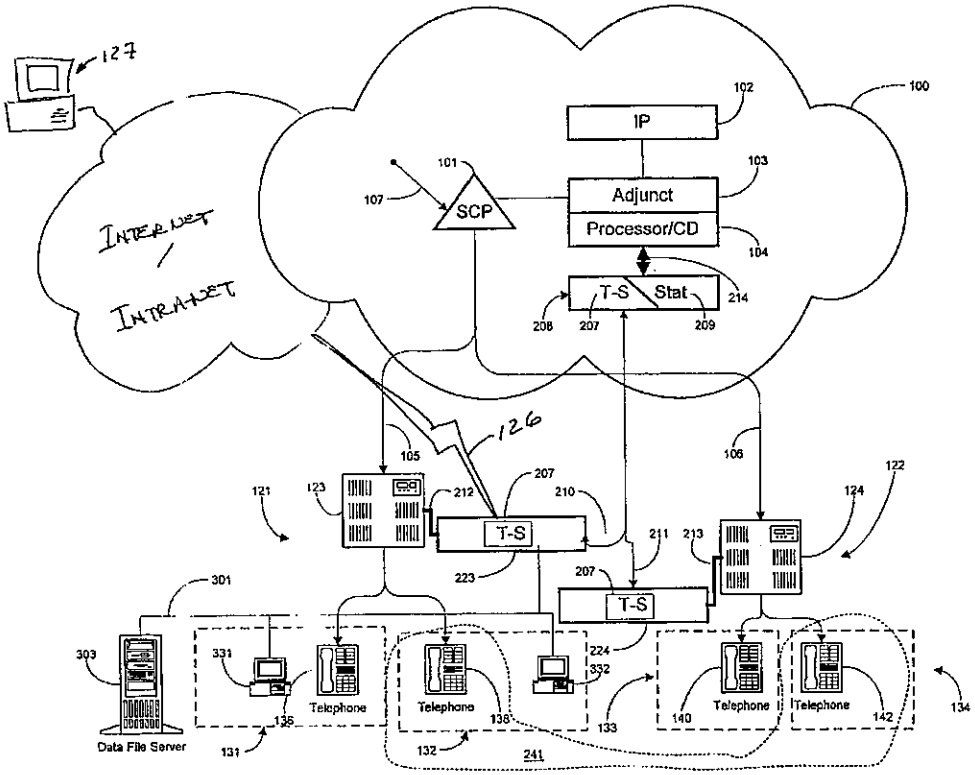
Primary Examiner—Huy D. Vu

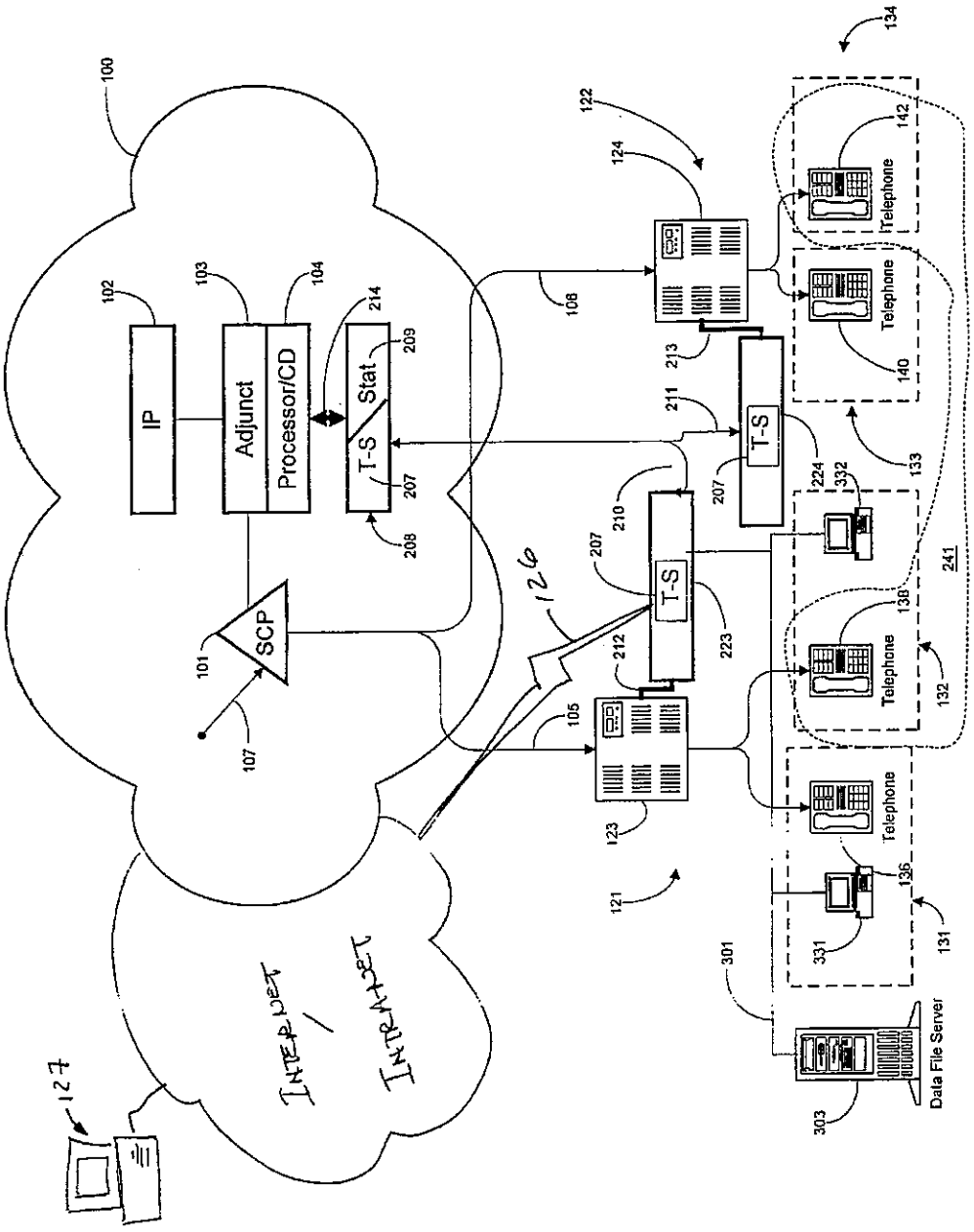
Attorney, Agent, or Firm—Donald R. Boys

[57] **ABSTRACT**

In an Internet Protocol Network Telephony (IPNT) call-routing system, a call-routing processor connected to a wide area network (WAN) for receiving and forwarding calls is adapted to receive IPNT calls and to route them to remote computer stations based on information available at the routing processor. Remote stations are adapted in a manner that enables an agent at a remote station, upon determining that a call has been mis-routed for any reason, to return the call to the routing processor, which is adapted for re-routing the call based on the fact of return. In some cases the agent who originally receives the call may elicit further information from the caller, and send the new information back to the router with the call. The router in this instance uses the new information in re-routing. Calls may be re-routed cold, by allowing the first agent to talk to the second before the call is connected to the second, or by conferencing the first agent, the second agent, and the caller.

4 Claims, 7 Drawing Sheets

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IP
103
Adjunct
Processor/CD
104
214
209
Stat
T-S
207
208
101
SCP
107
126
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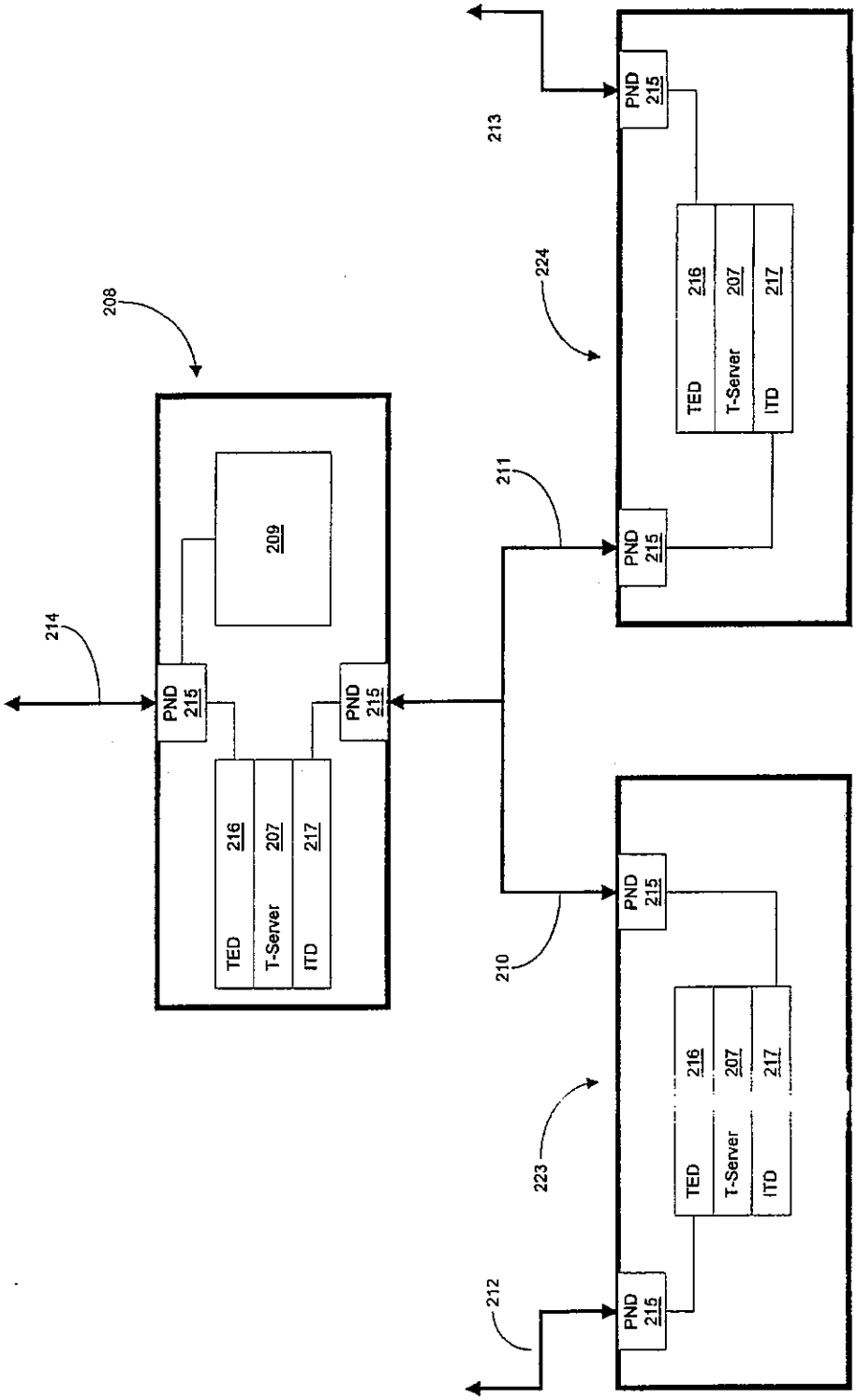
123
121
122
124
108
213
211
T-S
207
210
T-S
212
223
224
332
133
134
142
Telephone
140
Telephone
138
Telephone
132
241
Telephone
136
331
131
301
Data File Server
303
127
INTERNET
INTERNET

Fig. 1


208
209
214
PND 215
PND 215
TED 216
T-Server 207
ITD 217
211
213
224
PND 215
PND 215
TED 216
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210
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PND 215
TED 216
T-Server 207
ITD 217
212
PND 216

Fig. 2A

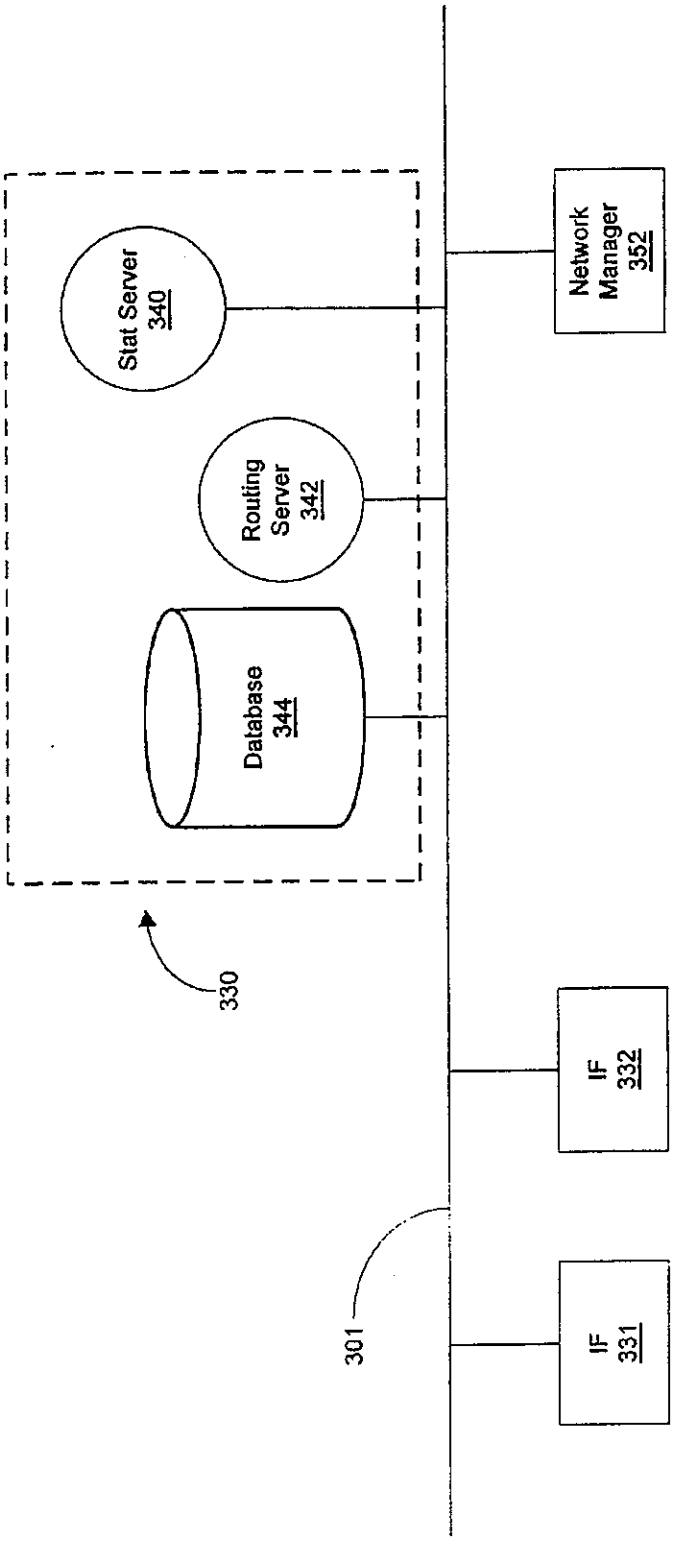

Stat Server
340
Routing
Server
342
Database
344
330
Network
Manager
352
IF
332
IF
331
301

Fig. 2B

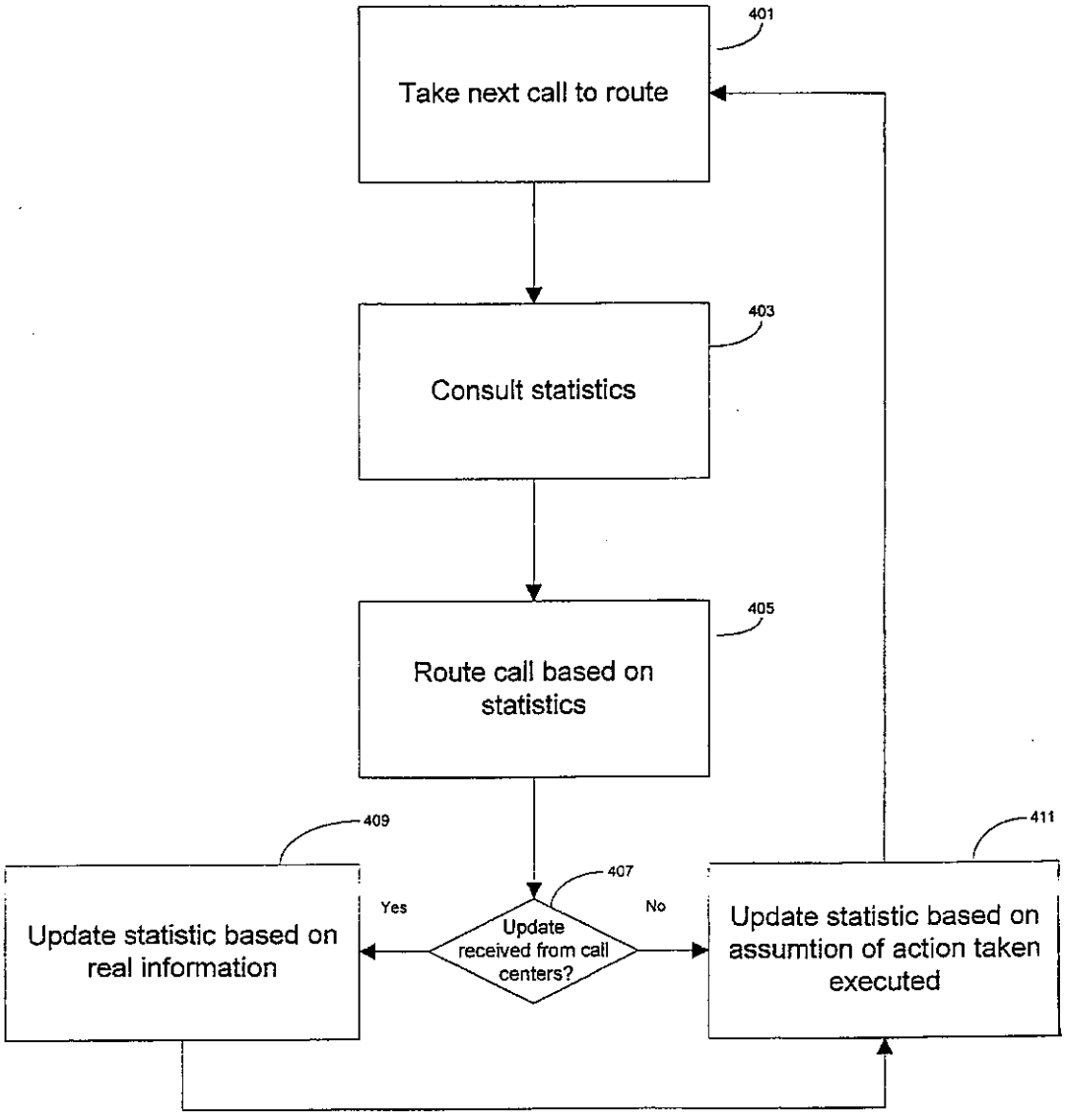

401
Take next call to route
403
Consult statistics
405
Route call based on statistics
409
Update statistic based on real information
Yes
407
Update received from call centers?
No
411
Update statistic based on assumtion of action taken executed

Fig. 3

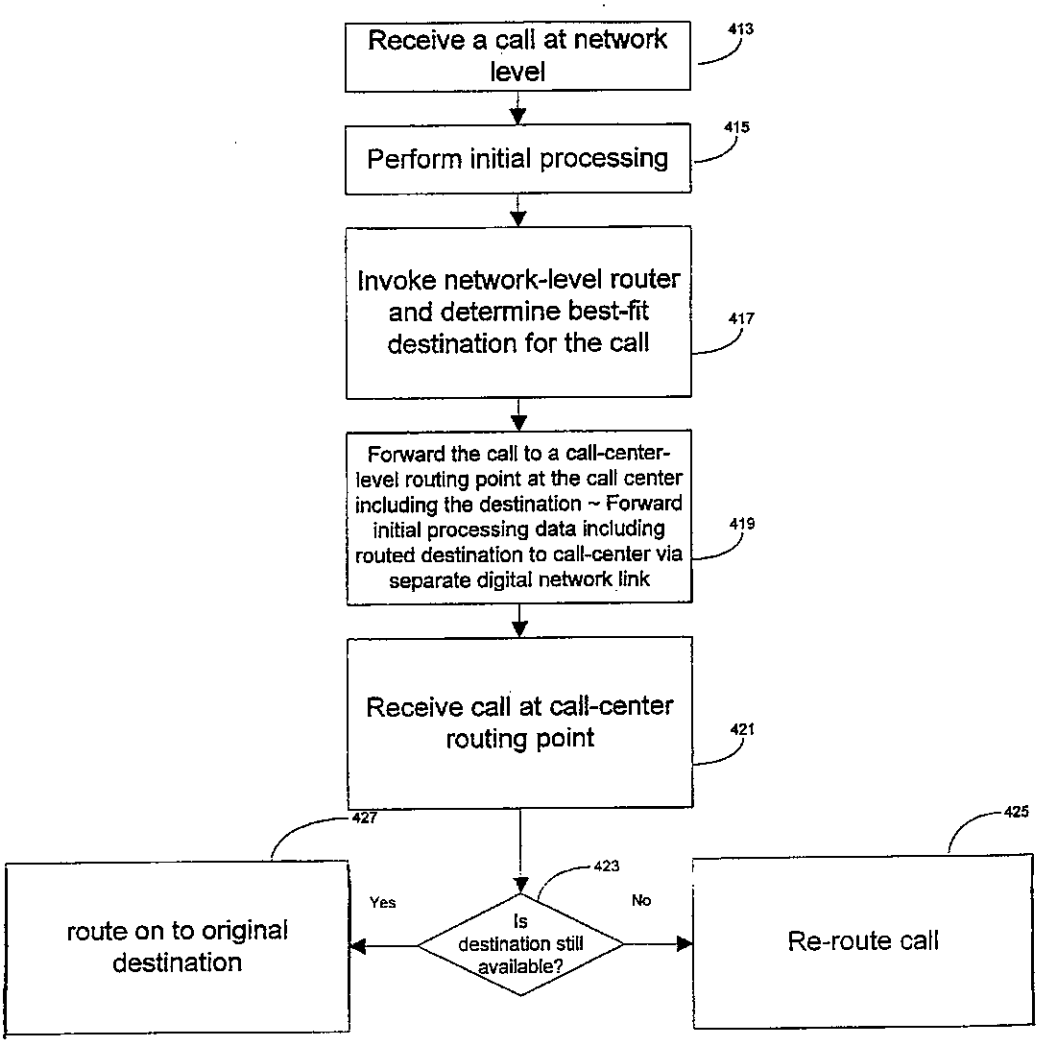

Receive a call at network level
413
Perform initial processing
415
Invoke network-level router and determine best-fit destination for the call
417
Forward the call to a call-center-level routing point at the call center including the destination ~ Forward initial processing data including routed destination to call-center via separate digital network link
419
Receive call at call-center routing point
421
427
425
423
Yes
No
Is destination still available?
route on to original destination
Re-route call

Fig. 4

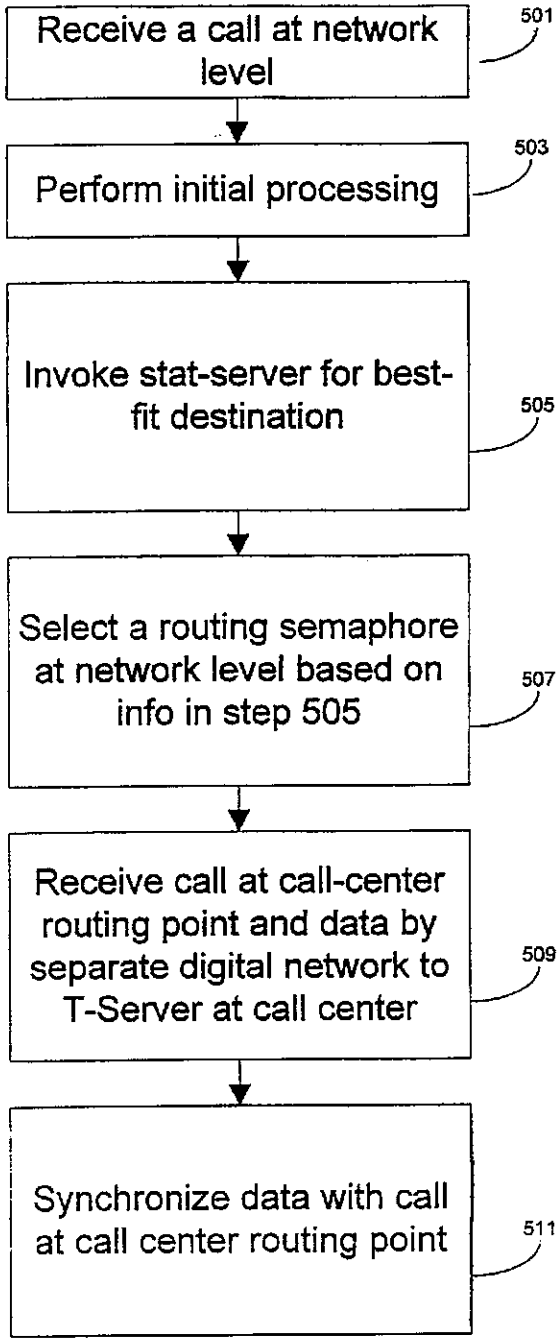
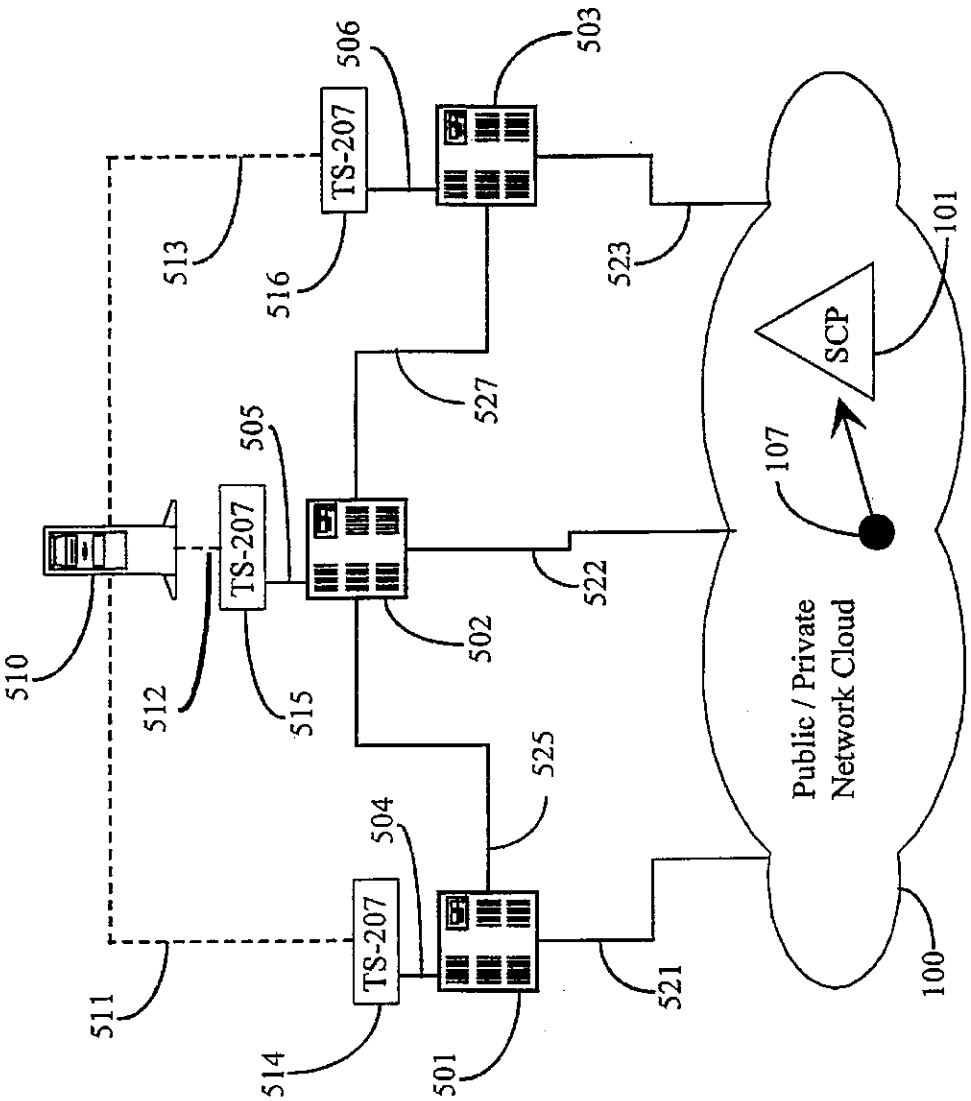

Receive a call at network level
501
Perform initial processing
503
Invoke stat-server for best-fit destination
505
Select a routing semaphore at network level based on info in step 505
507
Receive call at call-center routing point and data by separate digital network to T-Server at call center
509
Synchronize data with call at call center routing point
511

Fig. 5


TS-207
TS-207
TS-207
SCP
Public / Private
Network Cloud
100
101
107
501
502
503
504
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512
513
514
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516
521
522
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525
527

Fig. 6

AGENT-INITIATED DYNAMIC REQUEING

CROSS-REFERENCE TO RELATED DOCUMENTS

The present patent application is a Divisional application of copending patent application Ser. No. 08/928,410 filed on Sep. 12, 1997, which is a Continuation-in Part (CIP) of application 08/866,357, which is a CIP of application Ser. No. 08/802,660, which is a CIP of application Ser. No. 797,418. The prior applications are incorporated herein in their entirety by reference.

FIELD OF THE INVENTION

The present invention is in the area of telephone call processing and switching, and pertains more particularly to intelligent call-routing systems.

BACKGROUND OF THE INVENTION

Telephone call processing and switching systems are, at the time of the present patent application, relatively sophisticated, computerized systems, and development and introduction of new systems continues, including Internet-based telephony systems, which are known in the art as Internet Protocol Telephony (IPT) systems. It is also true that the older telephony call-switching networks, and the more recent Internet telephony systems are beginning to merge, and many believe will one day be completely merged.

Much information on the nature of such hardware and software is available in a number of publications accessible to the present inventors and to those with skill in the art in general. For this reason, much minute detail of known systems is not reproduced here, as to do so would obscure the facts of the invention.

One document which provides considerable information on intelligent networks is "ITU-T Recommendation Q.1219, Intelligent Network User's Guide for Capability Set 1 ", dated April, 1994. This document is incorporated herein by reference. There are similarly many documents and other sources of information describing and explaining IPT systems, and such information is generally available to those with skill in the art.

At the time of filing the present patent application there continues to be remarkable growth in telephone-based information systems, including IPT systems, wherein conventional telephone functions are provided by computer hardware and software. Recently emerging examples are telemarketing operations and technical support operations, among many others, which have grown apace with development and marketing of, for example, sophisticated computer equipment. More traditional are systems for serving customers of large insurance companies and the like. In some cases organizations develop and maintain their own telephony operations with purchased or leased equipment, and in many other cases, companies are outsourcing such operations to firms that specialize in such services.

A large technical support operation serves as a good example in this specification of the kind of applications of telephone equipment and functions to which the present inventions pertain and apply, and a technical support organization may be used from time to time in the current specification for example purposes. Such a technical support system, as well as other such systems, typically has a country-wide or even world-wide matrix of call centers for serving customer's needs. Such call center operations are more and more a common practice to provide redundancy and decentralization.

In a call center, a relatively large number of agents typically handle telephone communication with callers. Each agent is typically assigned to a telephone connected to a central switch, which is in turn connected to a public-switched telephone network (PSTN), well-known in the art. The central switch may be one of several types, such as Automatic Call Distributor (ACD), Private Branch Exchange (PBX), or PSTN. Each agent also typically has access to a computer platform having a video display unit (PC/VDU) which may be adapted, with suitable connectivity hardware, to process Internet protocol telephony calls.

At the time of the present patent application intelligent telephony networks and IP networks share infrastructure to some extent, and computer equipment added to telephony systems for computer-telephony integration (CTI) are also capable of Internet connection and interaction. There is therefore often no clear distinction as to what part of a network is conventional telephony, and what part is IPT.

In conventional telephony systems, such as publicly-switched telephony networks (PSTNs), there are computerized service control points (SCPs) that provide central routing intelligence (hence intelligent network). IPNs do not have a central router intelligence, such as a SCP. IPNs, however, have multiple Domain Name Servers (DNS), whose purpose is basically the same as the routers in intelligent networks, which is controlling the routing of traffic. Instead of telephony switches (PBXs), IP switches or IP routers are used.

An organization having one or more call centers for serving customers typically provides one or more telephone numbers to the public or to their customer base, or both, that may be used to reach the service. In the case of an IP network, a similar organization may provide an IP address for client access to services, and there are a number of ways the IP address may be provided. Such numbers or addresses may be published on product packaging, in advertisements, in user manuals, in computerized help files, and the like.

Routing of calls in intelligent networks, then, may be on several levels. Pre-routing may be done at SCPs and further routing may be accomplished at individual call centers. As described above a call center in an intelligent telephony system typically involves a central switch The central switch is typically connected to a publicly-switched telephone network (PSTN), well-known in the art. Agents, trained (hopefully) to handle customer service, man telephones connected to the central switch. This arrangement is known in the art as Customer Premises Equipment (CPE).

If the call center consists of just a central switch and connected telephone stations, the routing that can be done is very limited. Switches, although increasingly computerized, are limited in the range of computer processes that may be performed. For this reason additional computer capability in the art has been added for such central switches by connecting computer processors adapted to run control routines and to access databases. The processes of incorporating computer enhancement to telephone switches is known in the art as Computer Telephony Integration (CTI), and the hardware used is referred to as CTI equipment.

In a CTI system telephone stations connected to the central switch may be equipped also with computer terminals, as described above, so agents manning such stations may have access to stored data as well as being linked to incoming callers by a telephone connection. Such stations may be interconnected in a network by any one of several known network protocols, with one or more servers also connected to the network one or more of which may

also be connected to a processor providing CTI enhancement, also connected to the central switch of the call center. It is this processor that provides the CTI enhancement for the call center. Agents having access to a PC/VDU connected on a LAN to a CTI processor in turn connected to a telephony switch, may also have multi-media capability, including Internet connectivity, if the CTI processor or another server connected to the LAN provides control for Internet connectivity for stations on the LAN.

When a telephone call arrives at a call center, whether or not the call has been pre-processed at a SCP, typically at least the telephone number of the calling line is made available to the receiving switch at the call center by a telephone carrier. This service is available by most PSTNs as caller-ID information in one of several formats. If the call center is computer-enhanced (CTI) the phone number of the calling party may be used to access additional information from a database at a server on the network that connects the agent workstations. In this manner information pertinent to a call may be provided to an agent.

Referring now to the example proposed of a technical-service organization, a system of the sort described herein will handle a large volume of calls from people seeking technical information on installation of certain computer-oriented equipment, and the calls are handled by a finite number of trained agents, which may be distributed over a decentralized matrix of call centers, or at a single call center. In examples used herein illustrating various aspects of the present invention, the case of a decentralized system of multiple call centers will most often be used, although, in various embodiments the invention will also be applicable to individual call centers.

Even with present levels of CTI there are still problems in operating such call centers, or a system of such call centers. There are waiting queues with which to contend, for example, and long waits may be experienced by some callers, while other agents may be available who could handle callers stuck in queues. Other difficulties accrue, for example, when there are hardware or software degradations or failures or overloads in one or more parts of a system. Still other problems accrue due to known latency in conventional equipment. There are many other problems, and it is well recognized in the art, and by the general public who have accessed such call centers, that there is much room for improvement in the entire concept and operation of such call center systems. It is to these problems, pertaining to efficient, effective, timely, and cost-effective service to customers (users) of call center systems that aspects and embodiments of the present invention detailed below are directed.

Further to the above, IPNT systems at the time of the present patent application are much less sophisticated in provision of intelligent routing, parallel data transfer, supplemental data provision to agents, and the like. The advantages that embodiments of the invention described below bring to conventional telephony systems may also in most cases be provided to ITP systems and systems in which the form of the network between conventional telephony and IP protocol is blurred.

SUMMARY OF THE INVENTION

In a preferred embodiment of the present invention, an Internet Protocol Network Telephony (IPNT) call-routing system is provided, comprising a call-routing processor connected to a wide area network (WAN) and adapted for receiving, processing, and routing incoming IPNT calls to IP addresses on the WAN; and a computer station connected to the WAN and adapted for receiving IPNT calls from the call-routing processor. The computer station is adapted for an agent to receive an IPNT call originated by a caller, and to return the call to the call-routing processor, which is adapted to re-route the call to another IP address based on the fact of return.

In some embodiments the computer station is adapted for enabling the agent operating the station to elicit information from the caller, and to return the call to the call-routing processor associated with the newly-elicited information, and wherein the call-routing processor is adapted to re-route the call to a new IP address, using the newly-elicited information in the re-routing decision.

Also in some embodiments the further comprises a call-center having a managing processor wherein the computer station is one of a plurality of such stations coupled to the managing processor, the managing processor adapted for distributing calls received from the call-routing processor to individual ones of the associated computer stations. In this embodiment, the computer stations may adapted for agents to return calls for re-routing to the managing processor, which is adapted for re-routing to other computer stations adapted to the managing processor, or to the re-routing processor at network level, where calls may be re-routed to other call centers and computer stations remote from the managing processor.

In re-routing calls from a first agent at a first computer station to a second agent at a second computer station, the agents may be first connected before the call is connected. Alternatively, the agents and the caller may be conferenced.

Methods for practicing the invention are provided as well as apparatus and systems, and the several exemplary embodiments are described in enabling detail below, providing intelligent routing and re-routing for IPNT calls on wide area networks like the Internet, such capability not before available in the art.

BRIEF DESCRIPTION OF THE DRAWINGS FIGURES

FIG. 1 is a system diagram of a call-routing system according to a preferred embodiment of the present invention.

FIG. 2A is a block diagram representing communication functionality between equipment groups in embodiments of the present invention.

FIG. 2B is a block diagram illustrating a unique call center-level routing system in an embodiment of the present invention.

FIG. 3 is a process flow diagram depicting steps in a process according to a preferred embodiment of the present invention.

FIG. 4 is another process flow diagram depicting steps in a process according to another preferred embodiment of the present invention.

FIG. 5 is yet another process flow diagram depicting steps in yet another preferred embodiment of the present invention.

FIG. 6 is a system diagram of a call-rerouting system according to an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

General Description

FIG. 1 is a system diagram of a call-routing system according to a preferred embodiment of the present

invention, comprising two call centers 121 and 122. In this embodiment there may be many more than the two call centers shown, but two is considered by the inventors to be sufficient to illustrate embodiments of the invention. Each of call centers 121 and 122 includes a telephony switch (switch 123 for center 121 and switch 124 for center 122) providing routing to individual agent stations.

Call centers 121 and 122 in FIG. 1 are CTI-enhanced by virtue of a processor connected by a high-speed data link to the associated call center switch. At call center 121, processor 223 is connected by link 212 to switch 123, and at call center 122, processor 224 is connected to switch 124 by link 213. Each processor 223 and 224 includes an instance of a CTI application 207 known to the inventors as T-Server (T-S) 207. Further, each processor 223 and 224 at each call center is in turn connected to a local area network (LAN). For example LAN 301 is shown connected to processor 223 in FIG. 1. No equivalent network is shown at call center 122 for the sake of simplicity, although the architecture described herein for call center 121 may be presumed to be extant at call center 122 and other call centers as well.

Each call-in center 121 and 122 included in this example also includes at least two telephone-equipped agent workstations, which also each have a user interface (IF) to the associated LAN. Workstation 131 at center 121 for example has a telephone 136 connected to central switch 123, and a proximate user interface 331 to network 301. Interface 331 may be a PC, a network terminal, or other system, and typically provides a video display unit (VDU) and input apparatus (keyboard/pointer for example) allowing an agent to view data and make appropriate inputs. For descriptive purposes the computer workstation at each agent station will be termed a PC/VDU.

In like manner workstation 132 illustrated has a telephone 138 connected to central switch 123 and a proximate PC/VDU 332 providing an agent with display and input capability. For call enter 122 workstations 133 and 134 are shown having respectively telephones 140 and 142 connected to central switch 124, in turn connected to processor 224 by link 213. A local area network (LAN) equivalent to LAN 301 at call center 121 is not shown for call center 122 for the sake of simplicity in illustration, and PC/VDUs for the agents are similarly not shown for call center 122.

As is true with LANs in general, servers of various sorts may be connected to LAN 301 at call center 121. In FIG. 1 a data server 303, in this instance including a customer database is shown connected to LAN 301. A similar database server may also be connected to a LAN at call center 122. The customer database will typically comprise such as the names, addresses, and other information relating to customers for whom the call center is established, and also in many instances resource information for agents to access in helping callers with their problems.

In some embodiments of the present invention to be described in enabling detail below, agents at agent stations interact verbally with clients via the telephones at the workstations, and the PC/VDUs are utilized for such as screen pops with information about clients, scripts for agents to follow in aiding clients, and technical information and other data needed in interacting with clients. In other embodiments the PC/VDU equipment may be used more comprehensively, such as for video-conferencing with clients, receiving, storing and responding to electronic documents such as e-mail, and for Internet protocol telephony (IPT). In the case of Internet-based and related services, the CTI processor, or any other processor connected to the LAN at a call center may be Internet-connected, and provided with the necessary hardware and software known in the art for providing Internet access to agent's PC/VDUs also connected on the LAN at the call center.

Because of differences in conventional telephony service (CTS) and Internet telephony, and because the overt mechanism in both systems is modeled on the perceived, traditional model of telephone calls, a convention is necessary to distinguish. In the descriptions that follow, for this reason, CTS is referred to as intelligent network telephony (INT) and Internet telephony is referred to as Internet protocol network telephony (IPNT). This is not intended to imply that all CTS systems described herein are prior art, or that all IPNT systems described are inventive and unique. These distinctions will be made below as much as possible in every case described.

The main difference between CTS and IPNT is in the residence of network intelligence. In INT the firmware generating intelligence is mainly residing in network processors, where in IPNT, the firmware for the intelligence mostly resides in the end-equipment, whereas the network is often referred to as dumb network. Since most of the features of present inventions reside in the CTI server, known to the inventors as T-Server, and from there control certain network functions in certain ways, it is mostly irrelevant to their application, where the actual intelligence resides.

One of the variables in routing incoming calls, whether in INT or IPNT, is the skill set of each agent assigned to a workstation. This skill set may include a unique set of skills, resources and knowledge, such as, but not limited to, language capability, access to technical information, and specific training. In routing calls in a conventional system both at the network and at the call center level, the system and/or network needs to know such things as the status of any or all call centers, the availability of each agent, the skill set of each agent, the number of incoming calls, the number of calls waiting to be answered, and so forth. In a system using Internet protocol telephony for access to agents at call centers the same kinds of information needs to be available, and there needs to be also a way to route IPNT calls based on the information.

Referring again to FIG. 1, and specifically to call center 121, there are a number of ways that PC/VDUs 331 and 332 may have access to the Internet, and thereby to IPNT calls as well as to data services and the like provided at the call center. For example, any one of PC/VDUs at the call center, or other call center such as center 122, may have a modem connected to a phone line and software to connect to an Internet service provider. More likely, considering only call center 121. Processor 223 or another processor or IP router connected to LAN 301 may have Internet access and provide access to stations on the LAN. In specific aspects of the invention described below, Internet access and IPNT telephony relative to the inventive concepts are discussed in more detail.

In this example, control routines executable on processor 223 for call center 123 may access algorithms providing call routing at the call center level, and may also access data from data server 303 for use in routing decisions and the like. Similar routines run on processor 224 serving call center 122. In specific aspects of the invention described below, routing of IPNT calls will be discussed as well.

Telephone calls are routed to call centers 121 and 122 over conventional telephony lines 105 and 106 respectively from remote origination points (a customer seeking technical aid has placed a call, for example, to an advertised or otherwise provided 1-800 number). Cloud 100 represents

the intelligent telephone network system, and is referred to herein as a network cloud. This may be, for example purposes, a regional portion of the world-wide network, or may represent the entire world-wide network of connected telephone equipment. All conventional telephone calls routed to call-in centers **121** and **122** originate somewhere in network cloud **100**.

In addition to conventional telephone calls, there may be IPNT calls originating from computer platforms represented here by platform **127**, placed to the call centers through the Internet, an Intranet, or other data network, represented by cloud **125**, over a link such as link **126** shown connecting to processor **223**. It will be apparent to the skilled artisan that there are a number of alternative ways Internet and other data network access may be provided to stations at call centers. For descriptive purposes following descriptions will refer to cloud **125** as the Internet cloud, although it should be understood that this is exemplary, and there may be other data networks involved.

In this example an incoming conventional telephone call to be routed to a call center is represented by vector **107** into a Service Control Point (SCP) **101**. In some embodiments of the invention calls may go directly to one of the call centers illustrated, but in most embodiments an SCP is accessed first, and network-level routing may be done, wherein incoming calls may be routed based on information available to the SCP.

SCP **101** typically comprises a telephony switch somewhat more local to the calling party than the switches at call centers **121** and **122** illustrated. SCP **101** is coupled in this example to an adjunct processor **103** associated with a call-distribution processor **104**. Call distribution processor **104** has call statistics describing call distribution between call-in centers **121** and **122** (typically over a larger number of call-in centers than two).

An Intelligent Peripheral **102** is provided in this example coupled to SCP **101**, and its function is to provide initial processing of incoming calls. This initial processing may be done by voice recognition, eliciting information from a caller such as type of product and model number, language preference for communication with an agent, and much more, depending on the nature of the service provided by the organization providing the call centers.

A processor **208** including an instance of telephony server T-S **207**, also including an instance of a statistical server (Stat Server) **209** is coupled by two-way data link **214** to the other parts of the system at the initial call processing and routing system associated with SCP **101**. It will be apparent to those with skill in the art that the functions of CD Processor **104**, Adjunct Processor **103**, IP **102**, T-S **207** and Stat Server **209** may be accomplished in a variety of ways in hardware and software mix. There may be, for example, a single hardware computer coupled to central switch **101**, and the various servers may be software implementations running on the one hardware system. There may be as well, more than one hardware system, or more than one CPU providing the various servers.

In this embodiment, as described above, conventional calls incoming to SCP **101** are routed to call centers **121** and **122** via PSTN lines **105** and **106**. The convergence of lines **105** and **106** to SCP **101** and divergence to call centers **121** and **122** is simply to illustrate that there may be considerable switching activity between these points. Processor **208** connects to processor **223** and to processor **224** by digital data links **210** and **211**. Again the convergence is just to illustrate the network nature of these links, which may connect to many SCPs and to many call centers as well. In a preferred embodiment the network protocol is TCP/IP, which is a collection of data protocols which are not discussed in detail here, as these protocols are in use and very well-known in the art. There are other protocols that might be used, new protocols may be developed to provide better and faster communication, and other methods may be used to speed up communication. For example, Urgent Dispatch Protocol (UDP) may be used in some instances, which, for example, allows data packets to bypass routing queues.

Although not explicitly shown in FIG. **1**, processors at the SCP shown may have Internet access into cloud **125**, so IPNT calls may be directed to computer equipment at the SCP, and, as will be described further below, processes at the SCP may apply to IPNT calls as well as to conventional calls.

Processor **208** running an instance of T-S **207** as described above may control routing of calls, both conventional and IPNT at the network level, that is, calls received at SCP **101**, in the same manner that processor **223** may control routing at central switch **123**. In the case of routing of IPNT calls by the processes of an intelligent network router, the inventors are not aware of such intelligent routing in the art for IPNT calls, and this functionality is considered by the inventors unique.

It is emphasized again that not all embodiments of the present invention require all of the elements and connectivity shown in FIG. **1**, although some embodiments will use all of the elements and connectivity shown. Also, functionality in various embodiments of the invention described in enabling detail below will differ not in hardware and connectivity in all cases, but in application and execution of unique control routines in many cases.

Uniform Control of Mixed Platforms in Telephony (**3208**)

In a preferred embodiment of the present invention unique control routines are provided for execution on such as processor **223**, processor **224** and processor **208**, providing conmmunication ability thereby between call centers such as centers **121** and **122**, and between call centers and initial call processing centers such as that represented by SCP **101**.

FIG. **2A** is a block diagram representing a unique communication capability provided in a preferred embodiment of the present invention. There are, as described above in the Background section and known in the art, several different kinds and manufactures of call switching equipment. Each central switch uses a proprietary communication protocol for CTI applications. In CTI enhancement as known in the art, individual manufacturers provide processors connecting to their own switches and using the communication protocols proprietary to those switches. The computer enhancements, then, can serve a single manufacturer's switches, and provide communication between those switches. If a user, however, has multiple call center sites, for example, having equipment from different manufacturers, a difficult situation arises. If that user decides on a computer enhancement, depending on which manufacturer provides the enhancement, the equipment at the other site may quickly become obsolete. To communicate with the other site, it may be necessary to purchase all new equipment for the other site to be compatible with the computer-enhanced site.

Processors **223**, **224**, and **208** are shown in FIG. **2A** connected by links **210** and **211** as in FIG. **1**, with additional detail of both software and hardware illustrated in a particular exemplary embodiment. In each processor there is an instance of T-S **207** executable. To communicate with other devices each processor must have one or more ports configured to accomplish the communication. The implemen-

tation of such ports is represented in FIG. 2A by the representation PND **215**. PND **215** in each instance is a physical network adapter for the network to which it is intended to connect, such as microwave, optical, coaxial, ring-network, and the like, as well as the software drivers required to control those adapters.

Layered to each instance of T-Server **207** in each processor is a control routine for handling data communication with either an instance of telephony equipment (switch **123** for example) or another T-server. Hence, in FIG. 2A, each instance of T-server **207** is layered with a Telephony Equipment Driver (TED) on one side, and an Inter T-Server Driver (ITD) on the other side. Connectivity of an ITD or a TED to a PND is based on the external connection intended at the PND. For example processor **223** is connected on one side to switch **123** by link **212**, so TED **216** in the instance of processor **223** will be configured to drive communication with switch **223** (according to the make and manufacture of that switch). On the other side processor **223** is connected via link **210** to processors running other instances of T-server **207**. Therefore ITD **217** connects to PND **215** at link **210**.

Although not shown explicitly in FIG. 2A, which follows the architecture of FIG. **1**, it will be apparent to those with skill that a processor may also be configured with an instance of TED on each side of a instance of T-Server **207**, providing thereby a processor capable of interconnecting two central switches of different type, make, or manufacture directly. In this manner processors may be adapted to interconnect central switches of various manufacturers and processors running instances of T-Server **207**, and, by providing the correct PNDs, the processors thus configured may be adapted to communicate over any known type of data network connection.

In the matter of Internet protocol telephony, in the general description provided above with reference to FIG. **1**, it was described that Internet access may be made by processors at either call centers or SCPs in the conventional network, and that functions provided for conventional telephony may also be applied to IPNT calls. With regard to FIG. 2A, IPNT calls received at any processor associated with SCP **101** may be routed through processor **208** and via links **210** and **211** to processors **223** and **224**, where such IPNT data may be provided to agent's stations at associated call centers. In this process, IP addresses may be altered and substituted, as a way of routing the IPNT data. For example, an IPNT call may be directed to processor **208** by one IP address, and the IPNT call may be found to be from a particular client of the organization to which the call centers are dedicated. A routing decision may be made at the SCP such as in processor **208** as to the call center best adapted to deal with the client, and the IP address for a processor at the call center may be substituted.

In this manner, according to embodiments of the present invention, a system is provided for the first time that allows radically different telephony systems to be joined in high-functionality integrated intelligent networks.

Escalatory Reactive Call Routing (3207)

FIG. 2B is a block diagram depicting a unique escalatory reactive routing system **330** according to a preferred embodiment of the present invention, which may be implemented on a call center or at the network level, such as in call center **121** or such as in network cloud **100** of FIG. 1. In this routing system, as implemented at the call center level, processor **223** (FIG. 1) is notified when a call is received, and sends information about the call to a routing server **342**. Routing server **342** is typically implemented as a part of T-server **207**, which routes a call to an agent best qualified to answer the call based on predetermined criteria. The T-server having the routing server need not necessarily be implemented on processor **207** as shown in FIG. **1**, but could be resident elsewhere in the networked system. Routing server **342** typically directs switch **123** to route the incoming call to the designated agent.

Database **344** in FIG. 2B is a customer database typically maintained on such as data file server **303** (FIG. 1). Routing server **342** comprises control routines which may be executed on processor **223** (FIG. 1) or there may be a separate processor on network **301** executing the router. A stat server **140** is adapted to track and provide statistical data concerning calls made, completed and the like, and to maintain data on agents skill profiles and agent's activities, and to generate reports. Again, stat server **140** may execute on processor **223**, or on another processor connected to network **301**. Finally, a network manager **352** is also connected on the network, and is adapted to the task of managing aspects of LAN **301**.

Routing in this embodiment is typically based on (i) the skills set of the agent (ii) information relating to the calling party, (iii) activities of the call center, and (iiii) legal or other authorization held by an agent. Examples of the skills set of the agent are language, product knowledge, and the like. Examples of calling party information are products purchased, geographical location and the like. Examples of call center activities are number of available agents, calls previously handles by an agent, and the like.

At the same time an incoming call is directed to a particular agent, data retrieved from database **344** is directed on LAN **301** to the proximate video display unit (VDU) at the workstation assigned to that agent. The agent is then enabled to deal with the call in the best possible manner.

It is apparent to the present inventors that the expeditious functioning of routing system **330** is highly dependent on the expeditious functioning of the various elements of the overall system, including, but not limited to software and hardware elements. These elements include the functions of all of the elements shown in FIG. **1**, specifically including all of the communication links, both telephony and digital. If for example, stat server **340** or database **344** experiences a sudden degradation in service, the routing server is going to be delayed as well. As another example, there may be an unexpectedly large number of accesses to database **344** in a short time, overloading a search engine associated with the database, and this circumstance could degrade overall performance in routing. As a further example a partial or total loss of a communication link, such as digital network link **210**, will severely degrade overall system performance.

By virtue of network connection and interconnection, network manager **352** is enabled to track and monitor performance and function of all system elements, and to report to database **344** and to routing server **342**, and the routing server also has access to other data and statistics via stat server **340** and database **344**. Routing server **342** also has access in this embodiment to multiple routing algorithms which may be stored at any one of several places in the overall system. An object of the invention in the instant embodiment is to provide for executing different routing algorithms based on system performance as reported by network manager **352** and in accordance with data available from database **344**, stat server **340**, and received via digital network link **210** as described in further detail below. Database **340**, routing server **342**, and stat server **340** communicate through layered protocol as known in the art, including but not limited to layers for network-dependent

protocol, Internet protocol (IP), User Datagram Protocol (UDP), Simple Network Management Protocol (SNMP), and manager process.

In a preferred embodiment, routing server **342** selects a routing algorithm to be executed based on degradation in performance of part of the call center or components, either hardware or software, in an escalatory manner. The more the system degrades, the more the router reverts to emergency measures. The selected algorithm preferably reduces or eliminates access to or use of the component or resource adduced to be degrading in performance.

It will be apparent to those with skill in the art that the invention described with reference to FIGS. **2**A and **2**B is not limited to monitoring only system and component faults. It has broader application. For example, algorithms may be stored for operating according to load level. Other algorithms may be selected according to specific times-of-day, and such algorithms may be selected based on the time window in a 24-hour period. As another example, algorithms may be stored and selectable based on days of the week. Still other algorithms might be prepared to be accessed with introduction of new products and the like. Statistics may be tracked relative to the percentage of agents free, for example, and a routing algorithm may be accessed for the situation wherein 90% of agents are busy, routing calls only to the next free agent rather than following a skill-based routing algorithm. The invention in this embodiment allows routing algorithms to be selected and executed based upon a very broad congruence of circumstances, so that a call center may be operated at best efficiency even as circumstances alter rapidly, including circumstances of hardware and software functionality, as described in specific embodiments above.

In other embodiments of the instant invention escalatory reactive call routing may be implemented at the network level, with a router implemented as a portion of T-S **207** running on processor **208**. In this case stored routing algorithms may be selected and implemented in conjunction with functionality of network level components, both hardware and software, and in accordance with call loading into SCP **101**.

In the matter of Internet protocal telephony, IPNT calls received anywhere in the system can be redirected (routed) by the intelligence provided and described relative to conventional telephony, and such calls, once received and redirected, may be conducted to final agent destinations either through the connectivity of the calls centers and the intelligent network, or redirected by new IP address back into the Internet (or Intranet) and thence to agents equipment by direct connection.

Agent Level Call Routing in Telephony Systems (**3200**)

Referring now back to FIG. **1**, associated with SCP **101** in embodiments of the present invention, there is a processor **208** comprising an instance of a Stats-server **209** and an instance of T-Server **207**, which processor communicates with other components via two-way data link **214**. Communication in this embodiment is as illustrated in FIG. **2**A and described in disclosure above relative to FIG. **2**A.

In description above reference was made to TCP/IP communication on links **210** and **211**, and that this protocol is merely exemplary. There are other protocols that might be used, new protocols may be developed to provide better and faster communication, and other methods may be used to speed up communication. For example, User Datagram Protocol (UDP) may be used in some instances, which, for example, allows data packets to bypass routing queues.

In conventional systems known to the present inventors, routing at the network level, that is, in the network cloud **100** associated with switching equipment receiving incoming calls and routing these calls to call centers, is typically done with reference to statistical history of call center activity, and routing to call centers is to queues at the call centers. In this conventional method, activity at each call center in a network is tracked and provided to service control points, and incoming calls are routed to the calls centers based on the latest available history. As an example of such a history algorithm, if there are two call centers in the system, and the latest statistical history indicates that call center **1** has received twice as many calls as call center **2**, calls will be preferentially routed to call center **2** at a ratio to balance the activity. In this conventional system calls are routed from the network level to queues at the call center level. Once a call is received in a queue at a call center, the caller waits until his call is answered in order.

Referring now to FIG. **1**, in a unique embodiment of the present invention, termed by the inventors Agent Level Routing, actual transactions at the call center level, rather than historical summaries, are reported from call centers to service control points, and calls are routed to agents rather than to queues or groups. Referring to call center **121** as an example, transactions of central switch **123** are monitored by T-Server **207** executing on processor **223**, and shared on a continuing basis with T-Server **207** running on processor **208** associated with SCP **101**. This activity data is stored and accessible with reference to stat server **209** on processor **208**. Activity of central switch **124** at call center **122** is reported via link **211** also to T-Server **207** in cloud **100** (which represents one instance of possible multiple SCPs and T-Servers in the network. Each T-Server may serve more than one SCP). Actual activity at all call centers is reported to all SCPs in this manner.

In addition to this actual call center activity data, data relative to agent skills and the like is also provided and stored at the network level. For example, when an agent logs in at a call center, the availability of this agent is reported to the network level, and the stat-servers at the network level have agent profiles for reference in making routing decisions.

In the instant embodiment an incoming call **107** at SCP **101** is processed, for example, with the aid of IP **102**. With information about the needs of the caller, T-S **207** makes reference to the stat-server data of actual agent status at call centers, which is continuously updated via digital network links **210** and **211**, for example, from call centers, and to the available data on agent profiles and the like, which is updated as well, but at perhaps longer time increments. T-Server **207** makes a routing decision to an agent based on the best fit with the latest available data.

Once the routing decision has been made at the network level, the destination decision for the call is transferred by T-Server **207** running on processor **208**, for example, at the network level, to T-Server **207** at the call center where the agent to which the call is to go is resident. For exemplary purposes assume the destination is an agent at call center **121** (FIG. **1**), and the destination information is sent to T-S **207** running on processor **223**.

The call is received on line **105** at the call center and matched with the destination data received by T-S **207** on link **210**. T-S **207** on processor **223** now routes the call to the agent.

Call-center-level routing in embodiments of the present invention was described above, and may be done in the instant embodiment as well. For example, T-S **207** running on processor **223** has received a call on line **105** and matched that call with data received on link **210**, which data includes

an agent destination for the call based on the best fit available to T-S **207** running on processor **208** at the network level. In the time since the original routing occurred and the call and data have been received at call center **105**, the situation may have changed. The agent to which the call was routed may have, for example, logged off, and is no longer available. T-S **207** at processor **223**, executing a routing algorithm, may now reroute the call to the agent who is a next best fit and available at call center **121**.

As a further example of agent level call routing, consider a call received at SCP **101** from a customer who speaks Spanish, and indicates a preference for a Spanish-speaking agent. In FIG. **1** the pool of Spanish-speaking agents is represented by inclusion area **241**, encompassing workstations **132** at call-in center **121** and workstation **134** at call-in center **122**. An agent profile provided to stat-server **209** at the network level for each of these agents indicates the Spanish skill. The continuously updated transaction information from call centers **121** and **122** indicates the agent at telephone **138** is available, while the agent at telephone **142** is not available. Given this information, the call will be routed to call center **121** on line **105**, and the data as to agent destination will be sent to T-S **207** at call center **121** via digital link **210**.

In summary, in the instant embodiment, agent level routing is accomplished by providing actual call center agent status on a continuing basis to Service Control Points along with agent skill profiles and the like. Incoming calls are then routed to agents, rather than to queues at call centers. At the call center to which a call is routed with destination data for an agent, a further opportunity for routing allows such calls to be rerouted at the call center level.

In the matter of IPNT calls which may be directed first to a processor associated with a SCP in an intelligent network, given the origin of the call, just as is available form an ANI field, for example, in a conventional telephony call, decisions may be made as to agent level routing in a manner similar to the decisions made for conventional calls. It is only the mechanism for directing the IPNT calls that differs.

Moreover, IPNT calls directed to a processor associated with a SCP may be processed by an IP in an automatic manner, even including voice response, eliciting further information from the caller, which may then be factored into the routing of the calls.

It should also be understood that reception of and routing of IPNT calls need not be done at the same equipment and using the same software as is used for conventional telephony. Entirely separate centers may well be provided in various embodiments of the invention for handling IPNT calls. Internet servers may be provided for example, wherein adjunct processors, IP functionality, and the like is provided for IPNT in a manner parallel to that described herein for conventional telephony. In the matter of call center operation and management the idea of a dumb IP network may be just that. Intelligence is needed and preferred for managing large call volume to a wide range of possible destinations for best customer service.

Parallel Data Transfer and Synchronization (**3201**)

In another aspect of the present invention enhanced functionality is provided in routing and processing telephone calls from Service Control Points (SCPs) and other origination points at the network level or at other call centers established for servicing callers seeking service. This enhanced functionality enables agents at such call-in centers to have immediate access to information derived both from callers and from stored data. In descriptions below of the instant embodiment, assumption of SCP **101** in the network cloud and call center**121** is made for principle purposes of illustration.

In descriptions above, referring now to FIG. **1**, an intelligent peripheral (IP) **102** was described, serving to aid in initial processing of calls from persons seeking services from an organization providing such services from one or more call-in centers. In the above descriptions also, such callers were referred to as customers, following a continuing example utilizing an organizational structure having a technical service call-in operation for such as a computer equipment manufacturer.

Following the example of persons calling in to seek technical services in installing and/or configuring computer-related products, when such a caller first connects (FIG. **1**, vector **107**, SCP **101**), initial processing will typically include eliciting information from the caller relative to such as caller preferences and relationship of the caller to the service provider's customer database. For example, the caller may have just purchased a model of one of the provider's products, meant to be installed in or connected to a particular make and model computer, and is experiencing difficulty in installing the product and making it function properly with the computer. In another instance such a caller may have had the provider's product for some time, and is only recently experiencing difficulty.

Most manufacturers provide a service whereby a customer may register a product, and in the process of registration a range of information from the customer is solicited, which will typically include the exact nature of the product in question, including model number, and also the characteristics of the computer (in this example) to which the customer has installed or is attempting to install the product. If a customer has registered his/her purchase, that information will typically be recorded in the customer database, which, referring to FIG. **1**, may be stored on Data File Server **303** connected to LAN **301**, to which processor **223** running an instance of T-S **207** is also connected. In other instances there may be other information stored in the customer database. For example, in the case of an insurance company, the customer's name and address, policy number, and the like will be in the database.

If there is information about a call in a customer database at a call center, it will be advantageous to both the customer and the service provider to access that information and provide same to the agent who handles the customer's call. Such information cannot be retrieved, however, until and unless some correlation is made between the incoming call and the database.

In the instant embodiment of the invention, which is exemplary only, initial processing is used incorporating IP **102** to elicit information from a customer. This may be done preferably by recorded query and voice recognition. In such a system a call is answered, and a menu system is used to categorize the caller and to elicit and record sufficient information to enable routing (as described above) and hopefully to correlate a customer with an existing database. By recording is meant enrolling the nature of the responses in some form, not necessarily by voice recording. For example, a typical initial processing transaction involves a recorded query to the caller such as "Do you prefer Spanish or English". In some locales the query might be phrased in a language other than English. The caller is requested to respond typically by selecting a key on the touch-tone pad of his/her telephone. In many instances now as well, voice recognition is built into the initial processing machine intelligence, and the customer is instructed in verbal response, such as: "Say Yes or No". The IP in this case recognizes the response and codes data accordingly.

Information derived from a caller in such initial processing in conventional systems, as has been described herein

above, is coded and sent with the routed call, to be dealt with at the call center to which the call is routed after the call is received. In instant embodiments of the present invention, such data, and in some cases other data, is routed to a call center in parallel with the routed call, over a digital network link, allowing the data to precede the call in most cases. The data is re-associated with the call at the call center in a unique fashion described below. This parallel data transfer also makes the transfer switch-independent.

Referring again to FIG. 1, an instance of T-Server **207** is running on processor **223** connected to central switch **123** of call center **121**. Processor **223** is connected to digital data link **210**, and switch **123** is connected to the PSTN line **105**. In the exemplary embodiment there is an instance of T-Server **207** also running on processor **208** associated with SCP **101**. In the instant embodiment T-S **207** at processor **208** requests a semaphore from T-S **207** at processor **223** at the call center level. The semaphore is a virtual routing point in the call center, that is associated with the destination of the call, but is not the same as the destination of the call. Also, the semaphore is freed as soon as the call is completed. Once the semaphore is returned, the routed call is forwarded to switch **123** in this example over line **105** to the destination associated with the semaphore. Data associated with the call, which may be data elicited from a caller with the aid of IP **102**, is not coded and sent with the call, however, as in the prior art, but rather transferred to T-S **207** at processor **223** over digital network line **210**.

As digital network link **210** is generally a faster link than telephone line **105**, the data associated with a forwarded call will typically arrive before the call. This is not, however, a requirement of the invention. The data sent over link **210** to T-Server **207** on processor **223** includes not only data associated with the call, but the semaphore as described above. The call received on line **105** is not transferred directly to a final destination but to a semaphore routing point. When the call and the data are available, the call center T-Server **207** associates the call with the data by the knowledge of the semaphore to which the call has been associated. From the semaphore routing point the call is routed on to the final destination.

The semaphore can be accomplished in a number of ways. For example, the call can be directed to a virtual number and the data may have the virtual number in one field of the data protocol. The semaphore could also be an agent's extension number, but the call is still routed to a semaphore control point to be associated with the data before being routed on to the agent. Those with skill in the art will recognize that the semaphore association may be made in other ways as well.

The data typically in this embodiment is sent via network **301** to a VDU of the network interface at the operator's workstation to which the call is finally routed. This may be, for example, IF **331** or **332** in FIG. 1. Moreover, data associated with the call and transferred to T-S **207** at the call center may be used to associate the caller with the customer database in Data File Server **303**, and to retrieve further data which may also be forwarded to the VDU at the agent's workstation. As described above, it will most usually be the case that the data will arrive before the call, and correlation with a customer database may therefore be done before the call arrives.

The re-association (synchronization) of the call and the data at a re-routing point also affords an opportunity for further re-routing. There will be, as described above in the section on agent-based routing, some calls wherein the agent to which a call is originally has become unavailable in the time wherein a call is transferred. In this case T-Server **207** may re-route the call from the semaphore point to another agent, and send the data to the new destination.

It is not strictly necessary in the instant embodiment that the data be transferred by another instance of T-Server as described in the preferred embodiment immediately above. The call forwarded and the data transferred may in fact be sent by an originating entity such as another call center (i.e. PBX), an SCP or IP (network IVR), or some other IVR which may or may not be in the network.

In the matter of IPNT calls received at processors associated with SCPs, whether the SCPs are adapted to handle both conventional and IPNT calls, or just IPNT, data elicited from the caller may be prepared and provided by a separate link to a call center, and re-associated with the IP call redirected to an agent at the call center, or to a lower-level routing point at the call center, where both the call and the data may be rerouted. In this fashion all of the advantages of the invention described for conventional telephony may also be provided for IPNT.

Statistically-Predictive and Agent-Predictive Call Routing (**3202**)

In still another embodiment of the present invention predictive routing is incorporated into machine intelligence to expedite routing in a most cost-effective manner. Predictive routing according to embodiments of the present invention is based on knowledge of latency experienced in equipment while implementing certain operations, together with reasonable, but non-obvious assumptions that may be made to expedite operations. It is in implementing the assumptions that the inventions lie in the instant aspects and embodiments of the invention.

Referring again to FIG. 1, in the general case T-Server **207** running on processor **208** does call routing for calls incoming at SCP **101**. This routing is done with the aid of data stored at stat-server **209**, which may be data obtained from call centers on some regular basis.

In the instant embodiment related to group-predictive routing, incoming calls are routed to groups at call centers (call center **121** for example). In routing calls to groups, the goal is to route an incoming call to the group which has the lowest projected handling time for the call. The algorithm, for example, for handling time may be the present number of calls in the group queue times the historical average call length.

In this embodiment the projected handling time is extrapolated on past history and the last action which occurred, and is re-computed each time feedback from the group is received. The predictive nature is derived from the fact that each time a call is routed, an assumption is made that the new call is added to the queue at the group to which it routed, without waiting for the call center to return the information, which involves latency. For example, when a call is received at SCP **101** (FIG. **1**), there is a finite time involved before a routing decision may be made. Once the call is routed, there is a delay (latency) before the call is received at the call center and added to the group queue (in this example). There is a further delay for T-Server **207** to be cognizant of the arrival of the call. Then there is a delay until the time that T-Server **207** at processor **207** sends updated group queue data to T-Server **207** at processor **208**, which updates the historical data at stat-server **209**.

The overall latency and delay until historical data may be updated at the network level may vary, but an exemplary assumption may be made for purposes of illustration. Assume the overall delay between actual updates is twenty seconds. If calls are being received at the SCP at the rate of ten calls per second, two hundred calls will be received to be

routed in the time between updates of historical information upon which routing decisions are made. In the group-predictive embodiment described, each time a call is routed at the network level, an assumption is made that the call is actually received at the call enter group queue, and the data (stat server **209**) is recalculated based on that assumption. The next call received is then immediately routed based on the recalculated data based on the assumption. The update that eventually arrives is used to readjust the database to reality, and call routing continues between updates based on the assumptions made.

In the case of routing calls to logical destinations wherein further routing is done at the call center level, as described above for agent-based call routing, wherein agent status is reported to the network level, predictive routing according to an embodiment of the present invention may be done similarly to the predictive group routing described above. In the agent routing case incoming calls are immediately routed with an assumption that the agent to which the call is routed is then busy, and the status is corrected when actual agent state is returned.

FIG. **3** is a process flow diagram depicting the decision and action flow for a predictive routing process according to the instant embodiment of the invention. At step **401** action is precipitated on a next call to be routed. Action is typically controlled in this embodiment by an instance of T-Server **207** running on a processor at the network level. At step **403** current statistics are consulted, which, in the case of group level routing comprises an indication of projected handling time for each group in the decision set to which calls may be routed.

At step **405** the call is routed based on the statistics available. At step **407** it is determined whether or not a real update to the statistics has been received. If Yes, at step **409** the statistical data is updated to reflect the real information, correcting all assumptions since the last real update, if any correction is necessary. Then control passes to step **411**, where statistics are updated based on the routed call as well.

If a real update is not yet received, at step **411** the statistical data is updated based on an assumption that the call just routed was completed, and the call is added to the statistics, which are recalculated based on the assumption. Then a next call is taken to be routed at step **401**.

In the case of agent level routing the process flow is much the same as that shown in FIG. **3**, except calls are routed at step **405** based on agent status, and updates are based on agent status. That is, when a call is routed, the assumption is that the agent is then busy. Agent status is updated to real data as real data is reported back to network level from call centers. If no real data comes back, an assumption based on statistical call length is used to 'best-guess' re-availability of that agent.

Group level predictive call routing may be done for conventional call centers that are capable of reporting only historical data to the network level. Predictive call routing based on agent status is only possible in the unique case wherein actual status of call center switches may be reported to network level.

It will be apparent to those with skill in the art that predictive call routing may be applied to directing and redirecting of IPNT calls as well as to routing conventional telephony calls as described above. The differences are only in the details of the connectivity and data protocols, all of which is well-known in the art. The inventive subject matter in predictive routing is in the decisions made based on predictive assumptions, not in the nature of the call or the organization of data packets and the like.

Dynamic Re-Routing (**3203**)

In yet another aspect of the present invention, dual routing is performed. Reference is made again to FIG. **1**, wherein a network level system shown in cloud **100** is enabled to perform original routing by virtue of an instance of T-Server **207** running on processor **208**. In the instant embodiment routing is done at the network level by any of the methods discussed above. That is to group level, agent level, logical application, and so on. Original routing, however, is not done to the actual destination. Rather calls are routed to a call-center-level routing point, and data is sent to the call center via the digital data link, such as link **210** to processor **223** running an instance of T-Server **207** and connected to switch **123**. The data sent comprises an indication or instruction of how the call should be treated.

Whenever a call is routed to a call center, it is never certain that by the time the actual call arrives, the destination will still be available, or the best fit for the call. There are many reasons for this. For example, because of latency in transmission and so forth, other calls may be routed to the same destination in the interim. Also, in many systems switches at the call center level are also accepting local calls as well as calls routed from the network level. In other instances some equipment malfunction of fault may misroute one or more calls. The uncertainty of availability when the call arrives is the reason for the instant embodiment of the invention.

At the call center routing point the call is synchronized with whatever data is sent, and a second routing request is generated. This second request is referred to by the inventors as "double-dipping". The second routing request is made to a local router running typically as a function of the instance of T-Server **207** executing on such as processor **223** (FIG. **1**).

Because the local router is closer to the requested destination, and because it arbitrates all incoming calls, it can confirm the original routing assuming the original destination is still free, or it can re-route the call if the destination is no longer available, or queue the call, etc.

FIG. **4** is a process flow diagram depicting a process flow in the "double-dip" embodiment of the present invention described herein. At step **413** a call is received at the network level. At step **415** initial processing is accomplished, which may include eliciting information from the caller. At step **417** the network-level router is called, and a best fit destination is determined for the call based on the information available at the network level.

At step **419** the call is forwarded, but not to the best-fit destination determined. The call is forwarded rather to a routing point at the call center local to the best-fit destination. Data associated with the call, including the best-fit destination determined in step **417** is forwarded to the call center via a digital data link such as link **210** in FIG. **1**. At step **421** the call is received at the call center routing point.

At step **423** it is determined whether the originally routed destination is still the best destination according to information at the call center level. If so the call is forwarded to the original destination at step **427**. If not, the call is re-routed based on local information by the local router.

It will be apparent to the skilled artisan that dynamic rerouting, like other aspects of the present invention, may apply to IPNT calls as well as to conventional telephony as described above. IPNT calls may be directed to selected destinations, synchronized with data perhaps provided by a different route, and the redirected, even several times if necessary.

External Positivistic Forward Transfer in Call routing Systems (3204)

In yet another embodiment of the present invention calls are routed to call centers and data passed in a switch-independent manner, similar to that described above in the section entitled *Parallel Data Transfer and Synchronization.* In the previous description, however, the instance of T-Server running at the network level requests a semaphore from the call center. When the semaphore is returned, the call is routed and data is transferred on the digital network link, the data including the semaphore, which allows the data to be synchronized with the call at the semaphore point at the call center level.

In the instant embodiment, time to route and transfer is improved by having the instance of T-Server running at the network level (on processor **208** in FIG. 1, for example) co-opt a semaphore, based on the best available information then at the network level. This presumption by the router in the T-Server at the network level eliminates the time required for negotiation with the T-Server at the call center. The semaphore assumed by the network level T-Server is freed later when CTI information is returned that the call was correctly processed.

As in the previous description, when the routed call arrives at the call center semaphore point, the data, by virtue of having an indication of the semaphore included, is synchronized with the call and the call is forwarded to the destination. Data may be provided to a VDU at the agent's workstation at the destination via LAN connection as shown in FIG. 1.

FIG. 5 is a process flow diagram indicating steps in practicing this embodiment of the invention. At step **501** a call is received. At step **503** initial processing is performed. At step **505** the router at the network level consults a stat-server (see element **209**, FIG. 1) for a best-fit destination. At step **507** the router selects a semaphore destination based on the information in step **507**. At step **509** the call is routed to the call center semaphore point and associated call data is routed via a separate data link (see link **210**, FIG. 1) to the call center. At step **511** the data and the call are synchronized at the routing point. Further step are as indicated above in the section titled *Parallel Data Transfer and Synchronization.*

It will be apparent to the skilled artisan as well that positivistic forward transfer may apply to intelligent routing of IPNT calls, just as it applies to conventional telephony calls as described in this section.

Agent-Initiated Dynamic Requeuing (3206)

In yet another aspect of the present invention a method is provided for rerouting calls from agent level, wherein the agent discovers, having received a call and interacted with the caller, that the call was misrouted, or needs attention by another qualified agent. By misrouted in this context is meant that for whatever reason the agent that received the call is unable to provide the service the caller wants or needs. The call may have been physically misrouted due to some error in hardware or software, so it is handled by a different agent than to whom it was originally routed, or, the call may have gone to the right agent, but the caller gave the wrong information, or insufficient information, for the system to get the call to an agent able and ready to provide the needed service, or, during the call, need arises for an agent with specific skills or knowledge.

In this embodiment a first agent has received the call and has discerned from the caller that another agent is required to handle the call. Potentially the agent also has a VDU with the caller's data displayed and input apparatus (keyboard, pointer) with which to communicate with the local T-Server.

In the conventional case the agent would be limited in options. The agent would transfer to or conference a physical phone number on the local or a remote central switch. The Automatic Call Distributor (ACD) on that switch would requeue the call. If the ACD were configured as a network ACD the call could potentially be distributed to other sites, but network ACD products typically work only between switches of the same manufacture. Also, the caller may have to wait again the full queue time.

In the instant embodiment of the present invention, by virtue of the presence and interconnectivity of the local instance of T-Server running on a processor (**223**, FIG. 1) connected to the local switch (**123**, FIG. 1), also connected to the agent's equipment by LAN **301**, and using unique control routines provided in T-Server **207**, the agent hands the call back to a local or a network routing point, potentially with added data elicited from the caller to better aid in further routing.

This operation is essentially agent-initiated double-dipping ala the description above in the section entitled *Dynamic Rerouting.* At the rerouting point rerouting of the call is requested of the local instance of T-Server **207**, and the call is redistributed. The agent does not know who is available where for this transfer, and ACD is not involved. The agent, however, in this embodiment of the invention may have a choice of selecting a cold, warm, or conference transfer, which the agent may do by any convenient input which has been programmed into the control routines in the preferred embodiment.

In a cold transfer, the agent simply sends the call back to the rerouting point with whatever new data can be added, and the call is then transferred to a new agent directly without any participation by the first agent. In a warm transfer, the first agent is connected to the next agent to whom the call is re-routed before the caller is connected, allowing the first agent to confer with the next agent before the caller. In a conferenced transfer the first agent and the caller are connected to the next agent at the same time.

It will be apparent to the skilled artisan that agent-initiated re-routing may apply to intelligent routing of IPNT calls, just as it applies to conventional telephony as described herein. For example, an agent may ultimately receive an IPNT call at his/her PC/VDU, either with or without a screen pop of data pertaining to the client placing the call and/or to scripting for the agent to follow in handling the call. It may become apparent to the agent that the call has been misrouted, or would, for whatever reason, be better handled by another agent. By virtue of adaptive software executing at the agent's station or at a connected processor, or both, such a call may be handed back to a routing point with whatever additional data the agent may have ascertained, and then be rerouted to a (hopefully) better destination based on the original and/or new data.

Number Pool Data and Call Synchronization

In yet another aspect of the present invention, a unique routing method is provided for rerouting calls between call centers while minimizing the number of destination numbers required for the purpose. It is well-known in the art that the overall cost of operating a call center is strongly influenced by the number of destination numbers that have to be maintained to provide for peak traffic. In this aspect of the invention two or more call centers are assigned unique number pools of destination numbers that are used by a router in a sequential order to reroute calls between call centers.

Referring now to FIG. 6, three call centers **501**, **502**, and **503** are illustrated having each an incoming telephone line

over which calls out of network cloud **100** are originally routed. Line **521** carries calls to call center **501**, line **522** to call center **502**, and line **523** to call center **503**. A service control point (SCP) **101** is shown in network cloud **101** with a vector **107** representing incoming calls that are initially processed, then routed to one of the three call centers.

It will be apparent to those with skill in the art that there may be more than one SCP sending calls to each call center, as there may be multiple 800 numbers used, the network may take any of several forms, and there may be more than the three call centers shown. The simplified representation of FIG. **6** is for purpose of illustration. There may also be other equipment in the SCP and a variety of protocols utilized in call processing and original routing.

It is unfortunate but true that not all calls routed to a call center are correctly routed, and may be handed over to agents at the call center where originally routed. A certain percentage of calls will be discovered to have been incorrectly routed, and to require rerouting to another call center. There may be any number of reasons for incorrect routing, and the reasons are not pertinent to the present aspect of the invention. What is important in this regard is that some calls will have to be rerouted.

In a conventional system, calls originally routed are sent to a destination number at a call center by a semaphore system, as has been described above, and sufficient destination numbers must be assigned and maintained at each call center to account for peak traffic. At the call center, calls are typically rerouted to agents at extensions at the call center, based on origination information and preprocessing information elicited at the SCP. The process of matching calls arriving at a call center with call data, and further routing calls to agents, and then clearing the semaphore so the destination number is free to be used again typically takes about twenty seconds.

The time of twenty seconds to handle an incoming call strongly influences the number of destination numbers that must be maintained. For example, if twenty incoming original calls per second are to be handled, a call center will need 400 destination numbers to allow twenty seconds to handle each call.

I like manner, in a conventional system, calls that have to be rerouted will each take the twenty second processing time, and additional destination numbers will have to be maintained for the rerouting traffic.

In the embodiment of the present invention illustrated by FIG. **6** a main re-router **510** is provided connected by a digital network link **511** to call center **501**, by digital network link **512** to call center **502**, and by digital network link **513** to call center **503**. In practice, actual routing is accomplished, as known in the art, by control routines executed on a computer platform, known typically in telecommunications art as a processor. In the description herein the term router is meant to encompass all of hardware/software characteristic of routing, thus reference is made to router **510**.

In this embodiment the connection from router **510** to each of the call centers is through dedicated processors (**514**, **515**, and **516** respectively) further connected to the respective call centers by CTI links **504**, **505**, and **506**, and each running an instance of T-server **207** described previously. This is a preferred embodiment, but in some embodiments the connection may be directly to the switch at the call center, assuming that the call center switch is adapted to execute the necessary control routines in conjunction with router **510** as described more fully below. Further, in this embodiment call centers **501**, **502**, and **503** are interconnected by telephone lines **525** and **527**. These lines are preferred, but not strictly required in practicing the invention, as calls may also be rerouted between call centers back through network cloud **100**.

It will be apparent to one with skill in the art that there may be many more than three call centers such as **501** connected to the network. In this instant embodiment there are only three call centers shown, however, this number is deemed sufficient for the purposes of illustrating an embodiment of the present invention.

In conventional network routing systems, as described above, destination numbers are assigned to a typical call center, and it to these destination numbers that incoming calls are routed. These destination numbers are phone numbers paid for by the company that operates the particular network. A typical call center may have many hundreds of destination numbers assigned to it. In a typical embodiment, each destination number costs about one dollar per month to maintain. In the case of a large network there may be many call centers, each having many hundreds of destination numbers that are generating costs to the company.

In the present embodiment of the invention unique number pool assignments are made to each call center interconnected by router **510**, and used sequentially for rerouting of calls between call centers.

In the instant embodiment incoming calls are routed to various call centers, such as call center **501**, via Telephony lines **521**, **522**, and **523**, as described above. The call center destination to which a call will be sent is based on information obtained from the caller at SCP **101**. Call center **501** having received a call, then sends a Call Arrival Message (CAM) to main router **510**. Main router **510** uses the information provided in the CAM to make a routing decision. Main router **510** may also, in some embodiments, request additional information by sending a Route Request Message. A RRM would typically access additional information related to the caller that may be stored on a database or file server somewhere on the network. After a RRM is received, a Route Request Response (RRR) is sent back to main router **510**. If main router **510** determines that the call has been routed properly, then the call is forwarded on to it's final destination such as an agents extension, etc. In this case conventional destination numbers would apply, and a semaphore would be sent back to the origination point when that particular call has been forwarded freeing it's destination number for the next call. This process takes approximately 20 seconds over conventional network lines.

However, if it is determined that a more appropriate call center such as call center **503** would best handle the call that arrived at call center **501**, the call is rerouted to call center **503**. Router **510** maintains a data set (pool) of unique destination numbers assigned to each connected call center for the purpose of handling the rerouted traffic. These are not the same destination numbers used by origination points in the network for sending original calls to call centers. It is not required that there be any sequential association in the actual destination numbers. What is required and maintained by router **510** is that the destination numbers at each call center be identified in a sequential order. For example, there is a first number for center **501** a second number for center **501**, and so on, up to a last number for center **501**. The same is true for numbers assigned in a unique pool to call center **502** and call center **503**.

Consider as a very simple example that the unique pool of rerouting destination numbers for call center **502** has three numbers designated for our purpose as A, B, and C. A call arrived at call center **501**, and it is determined that the call

must be rerouted to call center **502**. This call is sent to destination number A. A second call arrives at call center **501** for which it determined that rerouting to call center **502** is proper. This call will be sent to destination number B at call center **502**. Similarly a call then arrives at call center **503** for which it is determined that rerouting to center **502** is needed. This call is rerouted to destination number C at call center **502**. Now, the next call at either call center **501** or **503** for which rerouting to call center **502** is needed is sent to destination number A at center **502**.

As operation continues, calls rerouted to call center A are sent sequentially to the identified numbers in the unique number pool associated with call center **502**, always returning to the first after the last is used, then proceeding again through the pattern. At the same time, calls arriving at either center **501** or **502**, to be rerouted to call center **503**, are sent sequentially to identified numbers at center **503**, and calls rerouted from **503** and **502** to **501** are sent sequentially to identified unique numbers at **501**.

As previously described, there may be many more than the three call centers shown, and there may be many more than three destination numbers assigned to each call center in the unique rerouting destination number pool. The sequencing may be quite complex, but, at each call center, the unique numbers are used in a sequential pattern so that after one number is used, it is not reused again until all of the other numbers assigned to that call center for the purpose of rerouting are used once more.

There is another difference between the rerouting and the original routing. That is that the origination and the final destination of a call are both known in the rerouting, and a rerouted call sent to one of the numbers in the unique rerouting pool may be therefor almost immediately handed off to an agent, or to a queue for an agent. The processing time is about one second. The quantity of destination numbers necessary for each call center in the unique pool is thus one number greater than the number of calls that can be routed by main router **510** in one second. Typically router **510** will be sized based on empirical data and statistics. If, in a hypothetical situation router **510** is capable of rerouting 100 calls per second, then the quantity of destination numbers for each call center is theoretically **101**, to be sure that each number used has a full second to clear before it is used again. In practice, a margin for safety may be employed by providing a quantity of destination numbers equaling, for example, 1.5 times the number of calls that can be routed in one second.

In FIG. **6** and the accompanying descriptions above relative to FIG. **6**, a single router was described, referred to as router **510**. In alternative embodiments of the present invention there may be more than a single router instance. There could, for example, be a router operable at each of the switches **501**, **502**, and **503** shown operating either on processors **514**, **515**, and **516**, or, if the switches permit, on the switches. In another alternative router **510** could be connected to other routers in other locations not shown, and these further routers may be connected to other switches at other call centers, and so on. In these alternative embodiments, incorporating multiple routers, individual routers may negotiate with other connected routers, delivering messages, unique destination numbers for routing, unique call ID, any data attached to the original call or retrieved based on data attached to the original call, so the other routers may perform continued or additional routing.

The Spirit and Scope of the Invention

It will be apparent to those with skill in the art that there are many alterations that may be made in the embodiments of the invention herein described without departing from the spirit and scope of the invention. Many individual hardware elements in the invention as described in embodiments above are well-known processors and data links. The connectivity, however, of many of these elements is unique to embodiments of the present invention. Moreover, many of the functional units of the system in embodiments of the invention may be implemented as code routines in more-or-less conventional computerized telephony equipment and computer servers. It is well-known that programmers are highly individualistic, and may implement similar functionality by considerably different routines, so there will be a broad variety of ways in code that unique elements of the invention may be implemented. Also, the invention may be applied to widely varying hardware and software systems, and to both conventional telephony calls, or to Internet protocol calls, or to calls made by data mechanisms in any data environment, be it Internet, Intranet, or other. Further, the links between processors running T-Servers at the call center level and processors running T-Servers at the network level may be done in a variety of ways as well to the associated equipment may be done in a number of ways, and there is a broad variety of equipment that might be adapted to provide the servers **223** and **224**, and other such servers associated with call centers. There are similarly many other alterations inn the embodiments described herein which will fall within the spirit and scope of the present invention in it's several aspects described. The invention is limited only by the breadth of the claims below.

What is claimed is:

1. An Internet Protocol Network Telephony (IPNT) call-routing system, comprising:

a call-routing processor connected to a wide area network (WAN) and adapted for receiving, processing, and routing incoming IPNT calls to IP addresses on the WAN; and

a computer station connected to the WAN and adapted for receiving IPNT calls from the call-routing processor;

wherein the computer station is adapted for an agent to receive an IPNT call originated by a caller, to elicit information from the caller, and to return the call to the call-routing processor associated with the newly-elicited information, and wherein the call-routing processor is adapted to re-route the call to a new IP address, using the newly-elicited information in the re-routing decision.

2. The call-routing system of claim **1** further comprising a call-center having a managing processor wherein the computer station is one of a plurality of such stations coupled to the managing processor, the managing processor adapted for distributing calls received from the call-routing processor to individual ones of the associated computer stations.

3. The call-routing system of claim **2** wherein the computer stations are adapted for agents to return calls for re-routing, and calls may be returned to the managing processor, which is adapted for re-routing to other computer stations adapted to the managing processor, or to the re-routing processor at network level, where calls may be re-routed to other call centers and computer stations remote from the managing processor.

4. In a system adapted for routing an incoming Internet Protocol Network Telephony call by a call-routing-processor from a caller to individual agents at individual ones of remote computer stations, a method for routing and re-routing calls, comprising steps of:

(a) routing a call to a first agent at a first computer station;

(b) determining, by the first agent that the call should go to another agent, the first agent eliciting information from the caller;

(c) returning the call to the call-routing processor by the first agent, including the information elicited from the caller;

(d) re-routing the call to a second agent at a second computer station by the routing processor using the elicited information from the caller in the re-routing.

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